SOVIET
GEOGRAPHY:
REVIEW & TRANSLATION

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AMERICAN GEOGRAPHICAL SOCIETY
Broadway at 156th Street, New York 32, N.Y.

Vol. I No. 5 May 1960

Soviet Geography: Review and Translation

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This translation and publication project was undertaken by the American Geographical Society in the conviction that the dissemination of the fruits of Soviet geographic research would be a service to American geographers and would help bring about professional contacts between geographers of the two countries. The National Science Foundation encouraged the project and is supporting it by a grant.

Readers are invited to send in their comments and discussion of articles published in *Soviet Geography*. Readers are also encouraged to submit suggestions as to published Soviet geographic literature worthy of translation. Such suggestions should relate to articles of general substantive or methodological interest rather than materials of narrow, specialized appeal.

The subscription rate for *Soviet Geography* is $6 a year. The price of a single copy is $1. Address all editorial and subscription inquiries to: *Soviet Geography*, American Geographical Society, Broadway at 156th Street, New York 32, New York.

Published monthly (except July and August) at the Lane Press, 305 St. Paul Street, Burlington, Vermont, by the

AMERICAN GEOGRAPHICAL SOCIETY

Editorial and General Offices: Broadway at 156th St., New York 32, N.Y.

Price $1.00 a number $6.00 a year

Second-class postage paid at Burlington, Vermont

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Some of the material in this issue was translated under contract Nonr-2892(00) with the Goegraphy Branch, Office of Naval Research, prior to the granting of financial support by the National Science Foundation.

TRANSLITERATION TABLE

Russian			English	Russian			English
А	а	*а*	a	Р	р	*р*	r
Б	б	*б*	b	С	с	*с*	s
В	в	*в*	v	Т	т	*т*	t
Г	г	*г*	g	У	у	*у*	u
Д	д	*д*	d	Ф	ф	*ф*	f
Е	е	*е*	e*	Х	х	*х*	kh
Ж	ж	*ж*	zh	Ц	ц	*ц*	ts
З	з	*з*	z	Ч	ч	*ч*	ch
И	и	*и*	i	Ш	ш	*ш*	sh
Й	й	*й*	y	Щ	щ	*щ*	shch
К	к	*к*	k	Ъ	ъ	*ъ*	”
Л	л	*л*	l	Ы	ы	*ы*	y
М	м	*м*	m	Ь	ь	*ь*	’
Н	н	*н*	n	Э	э	*э*	e
О	о	*о*	o	Ю	ю	*ю*	yu
П	п	*п*	p	Я	я	*я*	ya

(*) Instead of e, use ye at the beginning of names, after vowels and after the soft sign (').

The transliteration table is supplied for the general information of readers and to enable them to identify the geographic names on maps that will be reproduced from time to time in SOVIET GEOGRAPHY.

The transliteration system is the one proposed by the United States Board on Geographic Names. For more general use in textbooks and other popular needs, the following simplifications are recommended by the editor of SOVIET GEOGRAPHY:

1. Eliminate the use of (') and (").
2. Use i for iy, and y for yy.
3. Convert diphthongs ay, ey, oy, uy to ai, ei, oi, ui.

CLASSIFICATION OF THE CLIMATES OF THE USSR

Academician A. A. Grigor'yev and M. I. Budyko

(From Izvestiya Akademii Nauk USSR, Seriya geograficheskaya, 1959, No. 3, Pages 3 - 19.

The problem of the classification of climates has attracted the attention of many investigators since the middle of the nineteenth century. During the last century a whole series of climate-classification schemes have been proposed and maps of climatic regions have been compiled in many countries.

In appraising the general results of research in this field it must be acknowledged that in spite of the studies, outstanding for their time, by A. I. Voyeykov, W. P. Köppen and other authors, there is still no generally accepted viewpoint regarding the basic principles of climate classification. Such questions as the aim of climate classification, its methods, the procedures for the compilation of climate-classification maps, etc., are subject to wide discussion and are usually regarded as being far from a solution.

For this reason, it has been considered necessary to undertake a special study for the preparation of a climate-regionalization map of the Soviet Union, to be included in a Climatic Atlas of the USSR. Participating in this study project, besides the author of this article, were L. I. Zubenok, N. A. Yefimova and V. V. Mukhenberg (1958),staff members of the A. I. Voyeykov Main Geophysical Observatory, who compiled the necessary data on climate characteristics of the Soviet Union. In a preliminary discussion of the results of this work, the group received valuable advice from participants in various meetings. To all of them, and especially to A. P. Gal'tsov, O. A. Drozdov, G. D. Rikhter, Ye. S. Rubinshteyn and A. M. Semenova-Tyanshanskaya, the authors of this article express their sincere thanks.

Before setting forth the results of the work done, let us dwell briefly upon existing studies in the field of climate classification.

A recent monograph by Knoch and Schulze (1954), devoted to a review of the existing climatic classifications, contains references to 314 studies. This shows how extensive the literature is.

The various systems of climate classification can be divided into two main groups, special-purpose and general classifications.

Special-purpose classifications of climate are made to meet the needs of the various sectors of the economy: agriculture, industry, construction, transportation, communications, etc. All these classifications take into account both meteorological conditions and the degree to which the given area of economic activity is dependent on meteorological factors. Since such dependence changes rapidly with technical progress, it is evident that all special-purpose classifications require constant revision.

The existing special-purpose classifications of climate have practical importance and are widely used in economic planning. The agricultural climate classifications devised by F. F. Davitaya (1948, 1950), S. A. Sapozhnikova (1956, 1957), G. T. Selyaninov (1933, 1955), and others, have been especially valuable. These authors have proposed a number of new methodological procedures, important not only for special purposes, but also for general climate classifications.

The second group of studies, connected with the construction of general climate classifications, contains two main types of studies, one based on physical-geographic indices, and the other on the origin of climates (such a division is made, in particular, by A. P. Gal'tsov, 1956).

This group also comprises a third trend, which may be called empirical. The followers of this trend confine themselves to using individual meteorological characteristics of the air layer next to the earth, by which they more or less arbitrarily distinguish the climatic zones. This trend, represented mainly by the old studies of Supan (1879), Hult (1892-93) and others, is now of only historical significance . Among the more recent studies, the one by A. I. Kaygorodov (1955) retains some connection with the empirical trend.

The climatic classifications with a physical-geographic approach are based on the following fundamental considerations.

The average values of meteorological elements (unlike the geographic distribution of soil types and natural vegetation) exhibit no sharp boundaries between adjoining geographic areas. For this reason, individual meteorological data cannot be used to build a detailed system of climate regionalization based on substantial qualitative differences along the borders of the climatic regions. This difficulty can be overcome by taking into account the relationship between the climatic conditions and the plant cover, the soil type and other characteristics of the physical-geographic processes.

This method of building climate classification schemes has been used by most authors, including A. I. Voyeykov and other outstanding climatologists. To this trend also belong the fundamental studies of W. P. Köppen (1900, 1918, 1931 and others), who made the fullest use of available data for building a physical-geographic system of climate classification.

The second trend in the development of general climate classifications, the genetic trend, is represented by a smaller number of investigations. They include the work of Hettner (1930) and, in particular, certain studies by B. P. Alisov (1936,1950,1956 and others).

These studies try to construct a scheme of climate classification based on the climate-forming factors determining the origin of the climates of the various geographic regions. This requires detailed study of the connections between the general climatic conditions and the character of the atmospheric circulation, on the basis of which climate-regionalization maps are then constructed. The later studies of B. P. Alisov, in constructing regionalization maps, not only made wide use of the laws of atmospheric circulation, but also took into account data on radiation on the earth's surface and data on physical-geographic zonality.

This approach has definite value in determining to what extent the meteorological conditions in the air layer next to the ground are dependent on the circulation of the atmosphere in the various geographic zones. Especially useful in this respect are the world climate-classification maps constructed by B. P. Alisov, in which the spatial laws of the general circulation of the atmosphere are represented in a schematic, but very graphic form.

However, a few remarks should be made about this approach, involving the following considerations.

If we proceed from the physical theory of climate, we must acknowledge that only solar radiation at the outer limit of the atmosphere and the structure of the earth's surface are climate-forming factors in the precise sense of the word. The atmospheric circulation and the radiation flows in the atmosphere and at the earth's surface are determined by these external factors to the same extent as the average values of the basic meteorological elements. (In view of this statement, the definition of climate given in the well-known textbook edited by Ye. S. Rubinshteyn (1952) should be refined somewhat and expressed as follows: "The climate of a given locality is the meteorological conditions characteristic of it for a number of years and governed by the solar radiation reaching the outer limit of the atmosphere and by the structure of the earth's surface".) We cannot say that the atmospheric circulation or the radiation conditions at the earth's surface determine the climatic conditions of a given region . Strictly speaking, both atmospheric circulation indices (wind, pressure) and such radiation characteristics as the radiation balance are part of what we call the climatic conditions of a given locality. These indices affect the other meteorological elements (for example, air temperature and humidity), but they themselves depend essentially on the distribution of these same elements.

Existing genetic classifications of climate thus do not fully correspond to their designation because they use only certain internal relations essential for the process of climate formation and do not consider the dependence of climate upon the primary climate-forming factors.

A second remark regarding the existing genetic classifications relates to the method of distinguishing climatic areas in these classifications. The characteristics of atmospheric circulation widely used for this purpose, because of their complexity and the variability of circulation processes, usually yield only generalized boundaries between the various areas. It is difficult to justify the boundaries with quantitative meteorological data, so that regionalizing by circulation features must be based mainly on qualitative considerations. Such an approach can to a certain extent be justified in constructing a highly generalized world map, but the use of circulation indices is not suitable for more detailed regionalization.

The latest work of B. A. Alisov (1956,1957) proposes the use of physical-geographic zonality characteristics as well as circulation features to overcome that difficulty. This proposal, however, is somewhat eclectic because circulation conditions are not directly related to geographic zones and it is impossible to achieve consistent empirical correlation of such different criteria in a general system of regionalization.

With further development of the theory of climate a genetic classification in the precise sense of the word may still be worked out. It must be based on a consideration of the cause-and-effect relationships between the primary climate-forming factors (solar radiation, properties of the underlying surface) and the meteorological conditions of the various geographic regions.

Since meteorological indices determine to a considerable extent the dynamics of the physical-geographic surface processes, it is to be hoped that the physical laws relating the primary climate-forming factors to the physical-geographic zones will eventually be established.

Formulation of these laws could make it possible to construct an integrated classification of climate that would be both genetic (i.e., revealing the laws of climate formation) and physical-geographic (i.e., taking into account the relations between climate and natural zones). The construction of such a classification is, however, greatly impeded by the complexity and ambiguity of these laws.

Considering that the present achievements of climatology and physical geography permit us, if not to solve such a problem entirely, then at least to take a definite step toward a solution, we have set ourselves the task of working out a system of climatic classification reflecting both physical-geographic laws and certain laws of the origin of climate.

We regard the use of quantitative meteorological indices as indispensable in constructing such a system. Without them any climate-regionalization maps would inevitably be largely subjective. This already was noted by W. P. Köppen, who wrote of the climatic classifications existing at the time: "These classifications are similar to each other in many respects, but mine differs from the others in that it adopts definite constant features for the boundaries and thereby frees from any arbitrary interpretation comparisons of climates far removed from one another" (Köppen, 1931).

Recent studies have yielded a great deal of material on interrelationships between meteorological elements and on the flow of heat and moisture in the outer geographic envelope (the heat and water balance). This material supplements existing conceptions of the laws of climate formation in various regions.

In addition we now have a number of laws relating meteorological characteristics (including the indices of the heat and water balance) to geographic zonality.

Since these laws are in quantitative form, they can be used to construct a new system of climate classification meeting the above-mentioned requirement and based on a consideration of the cause-and-effect relationships between the processes in the outer geographic envelope.

Let us now examine the relationships between climatic conditions and the indices of other physical-geographic surface processes.

Previous work by one of the authors established the concept of interdependence of the dynamics of geographic processes in the outer geographic envelope, with climatic factors having the leading role. It was established that climatic conditions affect other natural processes mainly through changes in heat resources, water resources and their mutual relationships. In the same work, a balance method was proposed for studying the laws in question (Grigor'yev, 1937, 1946, 1951, 1954 and others).

As a result of further study, the authors (1956) formulated a periodic law of geographic zonality, establishing the relationship between the distribution of geographic zones and climatic energy factors. They found that the distribution of geographic zones was determined by the spatial distribution of the radiant-energy balance and by the distribution of the radiation-aridity index , a ratio of the radiation balance to the quantity of heat required to evaporate the total annual precipitation. It was found in various latitudinal belts having different values of the radiation balance of the earth's surface that natural zones similar in several essential features correspond to identical values of the radiation-aridity index.

In passing from one latitudinal belt to another in a series of natural zones corresponding to changes in moisture conditions, there was a periodic repetition in features of similarity along with differences caused by changes in heat-energy conditions.

The periodic law of geographic zonality makes it possible to construct a climate classification of the physical-geographic type based on quantitative meteorological indices that tie in with the distribution of the geographic zones. Since these indices are related by known quantitative laws with a whole series of other climatic factors, such a classification would also to a certain extent be genetic, i.e., it will reflect the conditions of weather formation in the lower layers of the atmosphere and on the earth's surface.

Among the above-mentioned quantitative laws, the relations between the radiation balance and the temperature conditions and evaporability (possible evaporation) are specially important for a study of the climatic factors of geographic zonality.

In previous work by one of the authors it was established (Budyko, 1955) that there is a very close connection between the radiation balance of the earth's surface and the sums of the air temperatures (for the period with temperatures above 10°C). In further study of the thermal factors of the natural surface processes, it was found necessary to pay special attention to the temperature of the earth's surface, which directly affects the development of vegetation, soil formation and other natural processes. A study devoted to this question (Budyko, 1958) proposed methods for determining the surface temperature and yielded a large amount of data on that meteorological element.

Having available data on the mean surface temperature for various periods of time and for various regions, it is natural to ask the question: How is this temperature related to the radiation energy balance on the earth's surface? To answer this question, the annual values of the radiation balance (computed for an underlying surface supplied with moisture) were compared with the sums of the surface temperatures for the period having air temperatures above 10°. It could be assumed that such a temperature index was most closely related to the conditions of development of the plant cover.

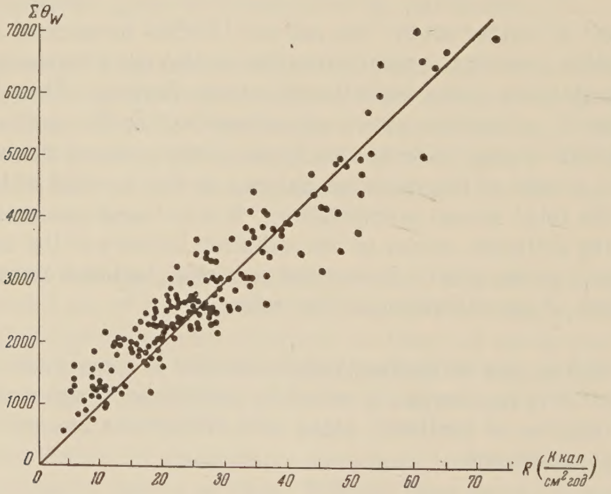


Figure 1

Relationships between the radiation balance and the sums of temperatures
Horizontal axis - Radiation balance in kilocalories per sq. cm. per year
Vertical axis - Sums of surface temperatures

This comparison was made for 248 stations equally distributed over the whole Soviet Union, including all the main geographic zones. The results are presented in Fig. 1, where the values of the radiation balance (R in kilocalories per sq. cm. per year) are plotted along the horizontal axis, and the sums of the surface temperatures along the vertical axis, and the computed data are marked by dots. The figure shows that the sums of surface temperatures are closely related to the radiation balance and proportional to its values. The mean values of the sums of temperatures exceed the values of the radiation balance by about a hundred times. It must be recalled that, as repeatedly noted (Budyko, 1951b, 1956), the annual value of the radiation balance differs little from its value for the growing period (i.e., for the period with air temperatures above 10°). Thus, the sums of the air temperatures during the growing period are proportional to the value of the radiation balance for the same period.

Previous studies (Budyko, 1951b, 1955) also investigated the question of the relationship between evaporability and the radiation balance. These studies established that precise determination of evaporability required the use of an integrated method taking into account the effects of temperature, humidity and radiation balance. The work of L. P. Seryakova (1957 and others) furnished a mass of material on evaporability and its values for the USSR have been mapped. As was pointed out earlier (Budyko, 1955-56), evaporability calculated by the integrated method is approximately proportional to the value of the radiation balance and corresponds on the average to the radiation value divided by the latent heat of vaporization.

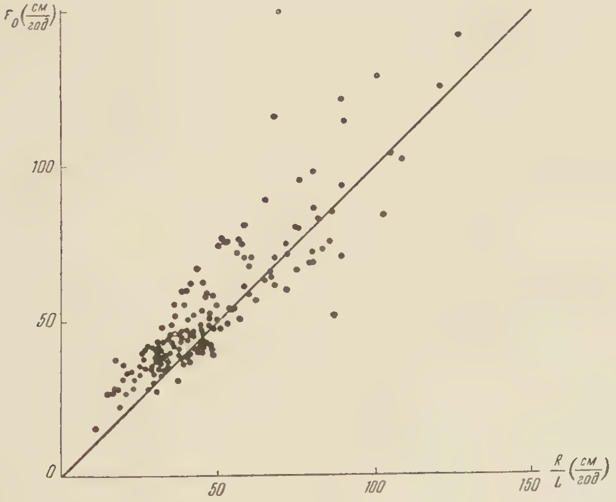


Figure 2

Relationship between the radiation balance and evaporability

Horizontal axis - Ratio of radiation balance to latent heat of vaporization in centimeters per year

Vertical axis - Evaporability in centimeters per year

To check this statement by the available data, the evaporability values calculated by the integrated method were compared with the ratio of the radiation balance (determined for a moist surface) to the latent heat of vaporization. Data from 178 stations evenly distributed over the Soviet Union were used for this comparison. The results obtained (Figure 2) confirm the above-mentioned law.

The relationship between the radiation balance and the sum of the earth-surface temperatures and evaporability can be used in studying the relationship between geographic zonality and meteorological factors. In this case the sum of surface temperatures will correspond to the level of the "energy base" of the physical-geographic surface processes, and the ratio of evaporability to precipitation will correspond to the mean moisture or aridity conditions.

Such an approach makes it possible to conceive more clearly the causal laws underlying the periodic law of geographic zonality. Moreover, the values of the sums of the surface temperatures and of evaporability can be determined more precisely from a comparison with the radiation balance, which facilitates the construction of detailed maps of the respective indices.

In view of these considerations, maps of the sums of surface temperatures especially constructed for the USSR for the period with an air temperature above 10° (N. A. Yefimova and L. I. Zubenok) and an aridity index equal to the ratio of annual evaporability to total precipitation (L. I. Zubenok) were used to work out a scheme of climatic regionalization. These maps were then compared with data on the geographic zonality of the USSR. The most detailed comparison was made with geobotanic maps because the distribution of the natural plant cover is the most reliable indicator of climatic conditions. For this purpose we used the best available geobotanic zonal maps of the USSR, compiled under the editorship of Ye. M. Lavrenko and V. B. Sochava at 1:4,000,000 (1954).

This comparison showed a close relationship between the isolines of the selected climatic indices and the geographic zone boundaries. The area in which the mean diurnal air temperature remains below 10° throughout the year was found to correspond to the zone of arctic deserts. The isoline of the sum of surface temperatures amounting to 1000° coincided with the southern boundary of the tundra zone (including the forest tundra). This natural boundary was found to be close to the isoline of the aridity index 0.45. (It must be noted that it is very difficult to determine the exact value of the aridity index for the extreme northern regions of the Soviet Union because of the substantial inaccuracy of the available precipitation data, which, as a rule, are too low. For this reason, we used runoff data and took into consideration known interrelationships between runoff, precipitation and the radiation balance in determining the aridity index for the Far North. However, for many northern regions even runoff data are not sufficiently reliable. Therefore, the question of the values of the aridity index for the tundra zone, and particularly for its East Siberian sector, requires additional study. It is quite possible that in some regions of the eastern sector of the Arctic the relative humidity conditions differ perceptibly from the excessive humidity conditions although these differences cannot yet be stated quantitatively with the necessary accuracy).

The area with an aridity index below 0.45, but with higher values of the sum of temperatures, agrees with the distribution of the high-mountain zone of alpine meadows. The isoline of aridity index 1 coincides very nearly with the boundary between the forest and the steppe zone (including the forest steppe). Within the forest zone, coniferous forests (tayga) are observed in the area with a temperature sum of up to 2200°, mixed and broadleaf forests of the temperate latitudes from 2200° to 4400°, and forests with subtropical vegetation at more than 4400°.

Aridity indices from 1 to 3 agree with the distribution of vegetation zones with insufficient moisture, principally steppe and forest steppe. Mountain steppe and forest steppe (as well as steppe and forest steppe in Siberia largely mountainous in character) are observed when the sums of the temperatures are lower than 2200°. With temperature sums above 4400° the steppe of the temperate latitudes is replaced by steppe with subtropical vegetation or xerophytic forest vegetation having subtropical features.

Aridity indices over 3 correspond to the desert zone, in which mountain deserts are marked by comparatively low temperature sums (below 2200°). In the northern zone of lowland deserts, lower temperature sums (up to 4400°) correspond to wormwood and saltwort deserts, while higher sums correspond to saksaul, shrub and ephemeral-plant deserts.

In accordance with these relationships, it is possible, in constructing a system of climatic regionalization, to use the gradations of basic climatic indices given in Table 1 and 1a.

Table 1. Moisture conditions

Moisture characteristics	Ratio of evaporability to precipitation (aridity index)	Geographic conditions
I. Excessively humid	Less than 0.45	Arctic desert, tundra, forest-tundra, alpine meadows
II. Humid	0.45 to 1.00	Forest
III. Insufficiently humid	1.00 to 3.00	Forest-steppe, steppe, xerophytic subtropical vegetation
IV. Arid	More than 3.00	Desert

Table 1a. Warm-season temperature conditions

Temperature characteristics	Sum of temperatures of the earth's surface during the period having air temperature above 10°	Geographic conditions
1. Very cold	Air temperature does not exceed 10° throughout year	Arctic desert
2. Cold	Less than 1000°	Tundra and forest-tundra
3. Moderately warm	1000 to 2200°	Conifer forest, alpine meadows, mountain steppes and steppes of Siberia, mountain deserts of the Pamirs
4. Warm	2200 to 4400°	Mixed and broadleaf forest, forest-steppe, steppe, northern desert
5. Very warm	Over 4400°	Subtropical vegetation, desert

Along with the basic climatic indices determining the conditions of geographic zonality, it is advisable, in constructing a detailed map of climatic regionalization, to use supplementary indices characterizing the conditions of the winter period.

Although the differences in the meteorological conditions of the cold season in our latitudes exercise considerably less influence upon the natural surface processes than the differences in the warm-season conditions, the severity of the winter and the character of the winter precipitation have definite significance for stream flow, soil formation, vegetation, etc. For this reason, six main types of meteorological conditions in the winter period, represented in Table 2, have beeen distinguished for the Soviet Union.

It should be noted that there are definite relationships between the meteorological conditions of the winter period and the natural plant cover. The area of severe winter climate in the forest zone corresponds largely to the area of distribution of the Daurian larch, one of the hardiest trees in low temperatures.

The boundary between the areas of moderately severe and the moderately mild winters in the forest zone of the European part of the USSR corresponds approximately to the boundary between the West European and the East

European tayga established by V. B. Sochava (1953). Farther south, in the steppe zone, the boundary between the two types of winters agrees with the transition from Black Sea steppe to Kazakhstan steppe.

Table 2. Winter conditions

Characterization of winter conditions	Meteorological indices of winter period
A. Severe winter with little snow	January temperature below -32°, greatest ten-day average snow cover less than 50 cm.
B. Severe snowy winter	January temperature below -32°, greatest ten-day average snow cover more than 50 cm.
C. Moderately severe winter with little snow	January temperature from -13° to -32°, greatest ten-day average snow cover less than 50 cm.
D. Moderately severe snowy winter	January temperature from -13° to -32°, greatest ten-day average snow cover more than 50 cm.
E. Moderately mild winter	January temperature from 0° to -13°.
F. Mild winter	January temperature above 0°.

Applying the above criteria and the respective number and letter designations, the climatic conditions of each area can be described by a combination of three symbols, for example: II 4 D (humid conditions, with warm summer and moderately severe snowy winter).

We represent the general scheme of classification of the climates of the USSR in the form of a table similar to a part of the table of the periodic law of geographic zonality (Grigor'yev and Budyko, 1956).

It should be emphasized that the climate-classification table is somewhat more detailed than the corresponding part of the periodic-law table, the quantitative indices having been partly refined. Unlike the table of the periodic law of zonality, which included data only for horizontal zonality (lowland areas), the climate-classification table also includes certain mountain zones (vertical zonality), which because of their relatively large areas had to be included on the climate-regionalization map.

As may be seen from Table 3, twelve types of basic climatic zones are distinguished in the USSR, corresponding to the types of geographic zonality, including certain types of vertical zonality. The main climatic zones are divided by the winter conditions into 31 types of intra-zonal climatic areas.

Table 3. Classification of the Climates of the USSR

Temperature conditions of warm season and sum of surface temperatures	Moisture conditions and aridity index			
	I. Excessively humid; less than 0.45	II. Humid 0.45 to 1.00	III. Insufficiently humid; 1.00 to 3.00	IV. Arid; more than 3.00
1. Very cold; air temperature lower than 10° throughout the year	I 1 C Arctic			
2. Cold; less than 1000°	I 2 A Tundra and I 2 B forest-tundra I 2 C I 2 D I 2 E			
3. Moderately warm; 1000° to 2000°	I 3 E Alpine meadows	II 3 A Conif. forest II 3 B II 3 C II 3 D II 3 E	III 3 A mountain III 3 C steppe and III 3 D steppe of III 3 E Siberia	IV 3 C mountain IV 3 D desert
4. Warm; 2200° to 4400°		II 4 C mixed and II 4 D broadleaf II 4 E forest	III 4 C steppe and III 4 D forest III 4 E steppe	IV 4 C northern IV 4 E desert
5. Very warm; more than 4000°		II 5 F Subtropical forest	III 5 E III 5 F Xerophytic subtropical	IV 5 E desert IV 5 F

The spatial distribution of the climatic zones and areas is shown on the attached climate-regionalization map of the USSR (Pages 15a and 15b; for explanation of legend see Table 3 on Page 14). Because of the necessarily small scale of the map, the isolines of the meteorological indices used were somewhat generalized, and the comparatively small isolated areas were not represented. The climatic regionalization of the mountain areas on this map therefore gives only the most general idea of the climatic conditions in those areas.

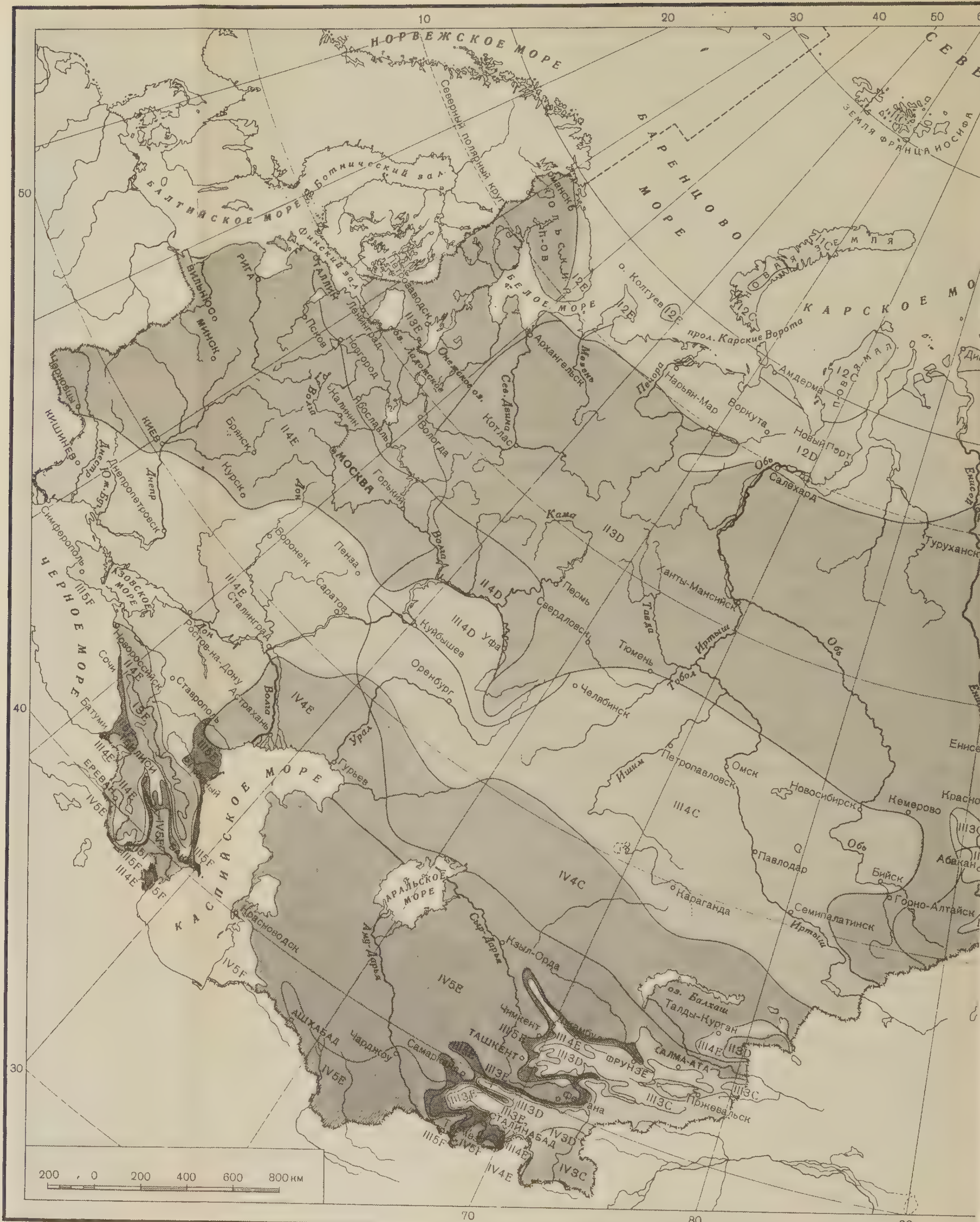
As was noted above, all the basic climatic zones are in definite agreement with the general geographic zonality and particularly with the geobotanic zonality. There are a few areas in which this agreement is noticeably disturbed. They are, in particular, the middle course of the Lena and the lower course of the Vilyuy, where our map indicates insufficient moisture, usually corresponding to forest-steppe vegetation, whereas the above-mentioned map of Ye. M. Lavrenko and V. B. Sochava shows coniferous forest predominating in this area. Data available for these areas indicate relatively wide distribution of alas (subsidence basins in Yakutia, resulting from melting of permafrost), whose vegetation is typically forest-steppe, as well as a large number of solonets salt-marshes, which usually develop under insufficient moisture.

In this connection it should be pointed out that a number of earlier geobotanic maps of this region showed relatively large areas with forest-steppe vegetation. While conceding that according to the latest data the alas areas are smaller than the forest areas, the question must still be raised: Which of these kinds of vegetation is the more typical of this area when the relief forms are of the lowland type? To answer this question we need additional data, which we do not possess for the time being.

Certain other divergences between vegetation types and climatic conditions are observed in a region strongly affected by soil factors, particularly in regions with sandy soils (where intra-zonal pine forests are widespread), on river floodplains, etc. However, the general agreement between the climatic and geographic zonality is quite satisfactory.

Inasmuch as geobotanic zonality is closely related to soil zonality, it is evident that the climatic indices used in the scheme under discussion are also determining for the process of soil formation.

We have a similar situation with respect to hydrologic conditions. In previous studies it was established (Budyko, 1948,1951a) that the radiation-aridity index determined the mean annual values of the runoff coefficient, i.e., the ratio of the annual runoff to the annual precipitation. A similar relationship exists between the aridity index and the runoff coefficient. The values of the aridity index and the radiation balance (or the sums of the temperatures of the earth's surface) determine the absolute values of the annual runoff. Each climatic zone on our map therefore has corresponding values of the runoff coefficient and the annual runoff.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НОРВЕЖСКОЕ МОРЕ
СЕВЕ
БАРЕНЦОВО МОРЕ
ЗЕМЛЯ ФРАНЦА ИОСИФА
Северный полярный круг
БАЛТИЙСКОЕ МОРЕ
Ботнический зал.
Финский зал.
Мурманск
п-ов Кольский
I2B
БЕЛОЕ МОРЕ
о. Колгуев
I2E
I2E
НОВАЯ ЗЕМЛЯ
I1C
I2C
КАРСКОЕ МО
прол. Карские Ворота
п-ов Ямал
I2C
Амдерма
Дик
РИГА
ТАЛЛИН
ВИЛЬНЮС
МИНСК
Псков
Петрозаводск
Ленинград
Новгород
II3E
оз. Ладожское
Онежское оз.
Архангельск
Мезень
Сев. Двина
Печора
Нарьян-Мар
Воркута
Новый Порт
I2D
Обь
Салехард
Енисей
Туруханск
Черновцы
КИШИНЕВ
КИЕВ
Днестр
Ю. Буг
Днепр
Днепропетровск
Брянск
Курск
Калинин
Волга
Ярославль
Вологда
Котлас
II4E
МОСКВА
Горький
Дон
Кама
II3D
Симферополь
Воронеж
Пенза
Волга
II4D
Пермь
Ханты-Мансийск
Свердловск
Тавда
Иртыш
Обь
АЗОВСКОЕ МОРЕ
III5F
III4E
Саратов
Сталинград
III4D Уфа
Куйбышев
Тюмень
Тобол
ЧЕРНОЕ МОРЕ
Сочи
Новороссийск
II4E
Дон
Ростов-на-Дону
Ставрополь
Оренбург
Челябинск
IV4E
I3F
Батуми
ТБИЛИСИ
III5F
Астрахань
Волга
Урал
Енисей
II4E
ЕРЕВАН
II4E
IV5E
IV5F
III5F
II5F
III4E
III5F
KАСПИЙСКОЕ МОРЕ
Гурьев
Ишим
Петропавловск
Омск
Новосибирск
Кемерово
Красно
III4C
Обь
III3C
Павлодар
Абакан
Бийск
Горно-Алтайск
IV4C
Караганда
Семипалатинск
Иртыш
АРАЛЬСКОЕ МОРЕ
Красноводск
Сыр-Дарья
Кзыл-Орда
Аму-Дарья
IV5F
IV5E
оз. Балхаш
Талды-Курган
Чимкент
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АШХАБАД
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ТАШКЕНТ
III3D
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Самарканд
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Пржевальск
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II3E
СТАЛИНАБАД
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III5F
IV6F
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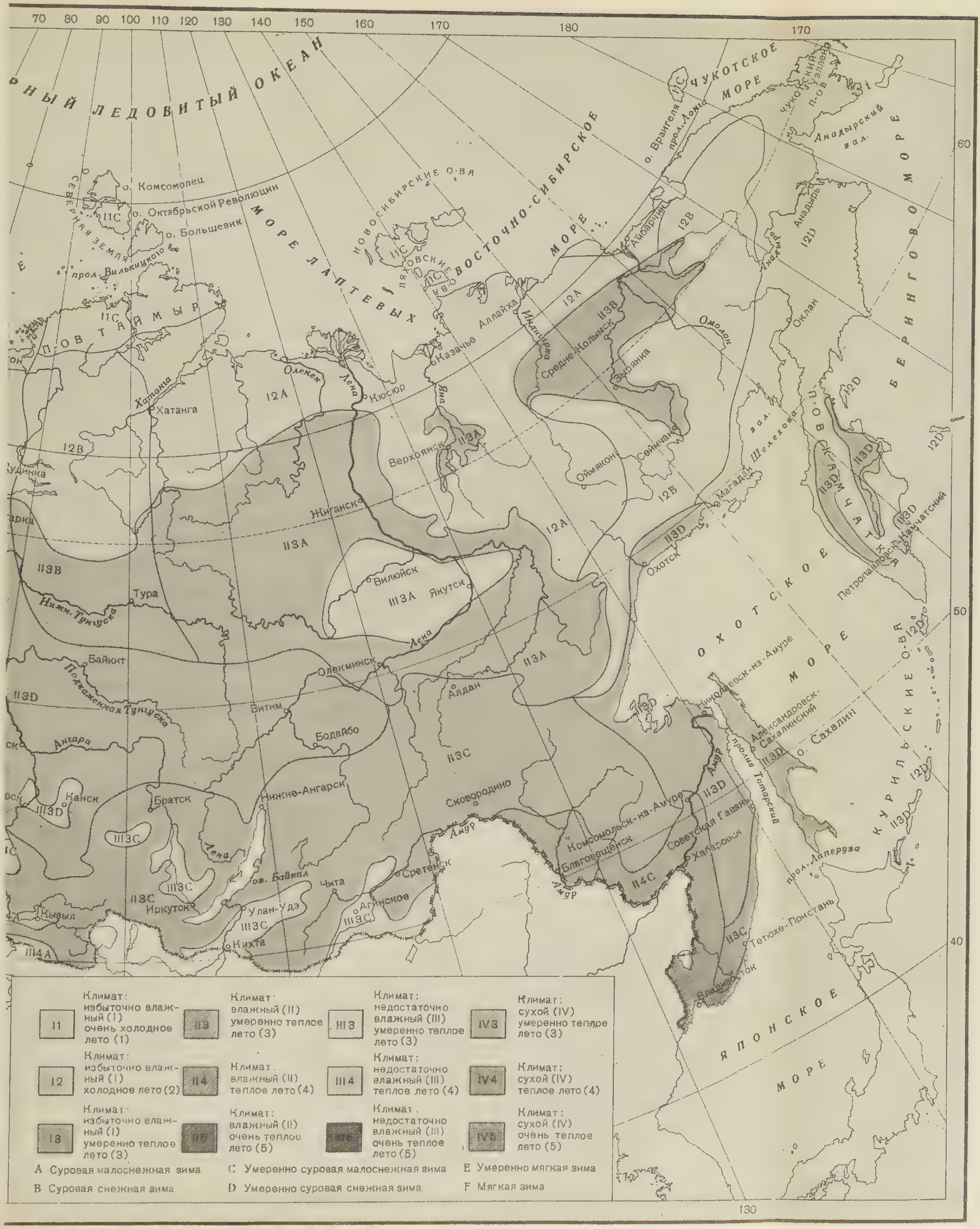
РАЙОНИРОВАНИЕ СССР


СЕВЕРНЫЙ ЛЕДОВИТЫЙ ОКЕАН
МОРЕ ЛАПТЕВЫХ
ВОСТОЧНО-СИБИРСКОЕ МОРЕ
ЧУКОТСКОЕ МОРЕ
БЕРИНГОВО МОРЕ
ОХОТСКОЕ МОРЕ
ЯПОНСКОЕ МОРЕ
П-ОВ ТАЙМЫР
П-ОВ КАМЧАТКА
Северная Земля
Новосибирские о-ва
Курильские о-ва
о. Сахалин
о. Врангеля
Чукотский п-ов
I1 Климат: избыточно влажный (I) очень холодное лето (1)
I2 Климат: избыточно влажный (I) холодное лето (2)
I3 Климат: избыточно влажный (I) умеренно теплое лето (3)
II3 Климат: влажный (II) умеренно теплое лето (3)
II4 Климат: влажный (II) теплое лето (4)
II5 Климат: влажный (II) очень теплое лето (5)
III3 Климат: недостаточно влажный (III) умеренно теплое лето (3)
III4 Климат: недостаточно влажный (III) теплое лето (4)
III5 Климат: недостаточно влажный (III) очень теплое лето (5)
IV3 Климат: сухой (IV) умеренно теплое лето (3)
IV4 Климат: сухой (IV) теплое лето (4)
IV5 Климат: сухой (IV) очень теплое лето (5)
A Суровая малоснежная зима
B Суровая снежная зима
C Умеренно суровая малоснежная зима
D Умеренно суровая снежная зима
E Умеренно мягкая зима
F Мягкая зима

The climatic indices we used are thus definite factors for all the basic physical-geographic surface processes.

Let us now take up the question of the extent to which our classification scheme reflects the laws of the origin of climate. As we noted above, solar radiation at the outer boundary of the atmosphere and the structure of the earth's surface are the only external factors that determine the dynamics of climatic processes.

The main influence of the structure of the earth's surface upon climate is evident in the distribution of the oceans and land with corresponding variations in the processes of moisture exchange and heat exchange.

It should be noted that the selected basic indices of the climate-classification scheme are related to the primary climate-forming factors.

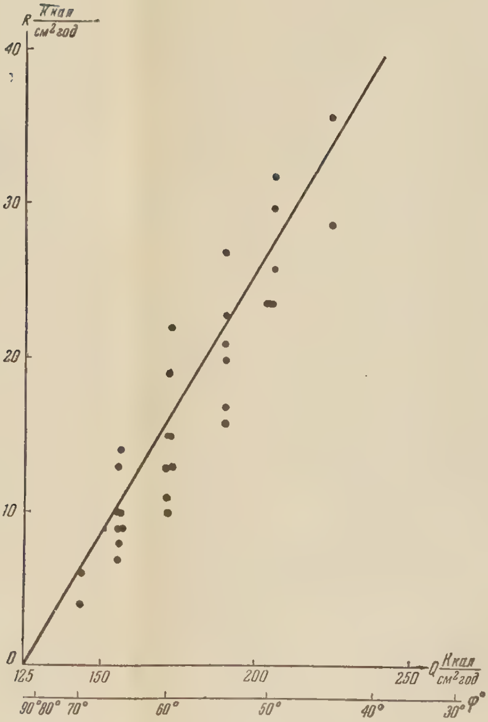


Fig. 3. Relationship between the radiation balance and the radiation at the outer limit of the atmosphere.

The distribution of the chief temperature indices of the warm season of the year -- the sums of the temperatures of the earth's surface, and the proportional radiation balance of a moistened part of the earth's surface -- reflects the distribution of solar radiation reaching the outer limit of the atmosphere. This is particularly evident from the data shown in Fig. 3, where the annual values of radiation reaching the outer limit of the atmosphere are plotted along the horizontal axis while the annual values of the radiation balance of a moistened part of the earth's surface are plotted along the vertical axis. The dots on this figure represent the calculated data for a number of points equally distributed throughout the climatic areas of the USSR.

The relationship shown in the following figure clearly indicates the close link between the radiation balance, and consequently the sums of temperatures, and the solar radiation beyond the confines of the atmosphere, i.e., the astronomic factors.

This relationship does not exclude substantial influence by atmospheric and, particularly, circulation conditions upon the sums of the temperatures and the radiation balance. For example, it was noted earlier (Budyko,1956) that in the total absence of circulation the annual values of the radiation balance of the land would be zero at all latitudes.

Although the absolute values of the radiation balance and of the sums of temperatures depend upon a wide range of factors, their relative changes in the USSR reflect mainly the influence of one factor - solar radiation at the outer limit of the atmosphere.

The second of the selected basic indices in the climate-classification scheme includes two basic factors: evaporability, closely related to the radiation balance of the earth's surface, and the annual precipitation, the distribution of which is subject to more complex laws than the radiation balance.

As the studies of O. A. Drozdov (1950,1956 and others) have shown, the mean total precipitation is determined in most cases by the values of the air temperature and humidity; the direct influence of the atmospheric circulation upon the total precipitation in lowland areas of the temperate latitudes is usually of less significance. In areas with a summer precipitation maximum and with a comparatively high relative humidity, the distribution of the total annual precipitation must therefore be to a certain extent latitudinal in character, reflecting the influence of astronomic climate-forming factors.

We know, however, that the mean values of the relative humidity decline toward the interior of continents. This is both a consequence of the reduction in total precipitation and the cause of that reduction. The decline of relative humidity in interior continental regions of the temperate latitudes points to an inadequate circulation link between the oceans and remote areas.

The distribution of the total annual precipitation in the lowlands of the USSR thus reflects to a certain extent the influence of two primary climate-forming factors: the radiation regime at the outer limit of the atmosphere and the distribution of land and oceans. Although the influence of these factors is complicated by a number of processes within the atmosphere, including atmospheric circulation, it remains sufficiently clear and can be expressed in the form of quantitative relationships established both by the empirical method and by taking into account certain theoretical laws of radiation processes, moisture circulation, etc.

The indices used for the winter season in the scheme of classification of the climates of the USSR also directly reflect the influence of climate-forming factors and particularly that of the distribution of land and oceans.

Without dwelling in more detail upon this question, let us give in conclusion a brief characterization of the basic climatic zones of the USSR.

The zone of excessively humid climate with very cold summers (I 1) corresponds to the area of arctic desert, situated on the islands of the Arctic Ocean and on the northern (mountainous) part of the Taymyr Peninsula. Ice-caps occupy a considerable part of this zone. The land free of ice-caps is under snow a large part of the year and has a very poorly developed soil cover (arctic soils). The extremely scant vegetation (lichens, mosses, etc.) does not form a solid cover and usually occupies less than half of the total surface of the soil. Because of the low temperatures and the high humidity, the evaporation in this zone is very small and in certain periods may be replaced by condensation processes. Thus, precipitation is mainly expended on runoff.

The zone of excessively humid climate with cold summers (I 2) coincides mainly with the tundra and forest-tundra zone, embracing the northern and northeastern coasts of the Soviet Union, as well as some interior regions of the northeast (mountain tundras). The tundra soils typical of this zone usually contain comparatively little organic matter and are characterized by the low activity of the biologic processes. The tundra vegetation, developing during the relatively short period of the absence of snow cover, is characterized by the predominance of mosses, lichens and (in the southern part of the zone) shrubs and stunted trees. Although the annual evaporation values for the tundra zone are known only approximately, it is evident that the smaller part of the precipitation is expended on this process, probably not more than 30 per cent on the average. Hence, comparatively high runoff coefficients are noted in this zone.

The zone of excessive humidity with moderately warm summers (I 3) corresponds to the areas of alpine meadows. Such conditions are observed in a number of mountainous regions of the Soviet Union; however, only on the Greater Caucasus Range do they cover a sufficiently large territory to be shown on the attached map. In this area a fairly diversified subalpine and alpine meadow vegetation develops on mountain-meadow soils. The precipitation insures an abundant runoff with a high runoff coefficient.

A characteristic feature of the landscapes of the climatic zones with excessive humidity is the absence of forest vegetation. It should be noted that the lack of forest in these zones is due not only to insufficient heat, but also to the moisture conditions, unfavorable to tree growth. In these zones the considerable excess of precipitation over evaporability maintains a high humidity in the soil throughout the year. The development of the tree root system is impeded by the lack of gaseous oxygen in the soil.

The influence of the moisture conditions upon the distribution of forest vegetation is clearly evident in the position of the southern boundary of the tundra, which shifts to higher latitudes in areas with less humid climate. This law also helps to explain the lack of forest in those alpine-meadow regions where the sums of temperatures are fully adequate for the development of forest vegetation.

The next group of climatic zones with humid climate (II), like the preceding one, comprises three zones.

Humid climate conditions with warm summers (II 3) are characteristic of the vast area of coniferous forests covering the northern part of the European USSR (except the northern coastal regions) and a large part of the Asiatic USSR.

Characteristic of this zone are podsol soils, on which a forest vegetation of dark conifer and light conifer species develops. The light conifer (larch) forests are situated mainly in the regions with the severest winter conditions. Although the mean total precipitation in the conifer-forest zone varies within broad limits, considerable soil humidity and rather high runoff coefficients are noted in all parts of this zone. The large runoff supplies the many large rivers in the conifer-forest zone.

The climatic zone of humid climate with warm summers (II 4) lies in the middle part of the European USSR and in the southern Amur and Maritime areas. In this area, mixed and broadleaf forests of highly diversified composition develop on gray-brown podsol and gray forest soils.

A comparatively small part of the USSR is occupied by the zone of humid climate with very warm summers (II 5) embracing western Transcaucasia and the southern part of eastern Transcaucasia. Typical here are the yellow and red soils, i.e., soils of the subtropical type. The broadleaf forests in this area are also, to a certain extent, subtropical in character. The abundant precipitation, considerably exceeding evaporability, maintains a comparatively high soil humidity and insures a high runoff.

The climatic zones with a humid climate are characterized by the development of various types of forest vegetation. The chief factor favoring the predominance of forest landscapes in these zones is the rather high soil humidity in the warm period of the year, which, however, does not exceed definite limits beyond which the lack of soil air prevents the development of the root system of trees.

It should be noted that forest vegetation can exist only if there is considerable transpiration, inasmuch as the intensity of turbulent diffusion at the tree-top level is much greater than the intensity of diffusion near the ground. Increased turbulent exchange and a large total tree-leaf surface make possible a comparatively high level of the assimilation process that insures the development of a considerable bulk of the non-productive plant organs (trunk and branches). When insufficient soil moisture limits the transpiration necessary for tree growth, the forest vegetation is dislodged by steppe vegetation, which is better adapted to a lack of soil moisture.

The zone of insufficient moisture with moderately warm summers(III 3) corresponds to the climatic conditions of a number of mountain regions of Soviet Central Asia and the sourthern part of Central Siberia. This zone also includes the vast area along the middle course of the Lena and the lower course of the Vilyuy. In the mountains of Soviet Central Asia this zone has mountain-steppe and sparse high-mountain vegetation; in the south of Siberia it has turf-grass and tansy steppes. In Southern Siberia, a part of this zone is occupied by pine forests, which, as is known, are intra-zonal in character. The plant cover along the middle course of the Lena, already mentioned above, is rather complex and is characterized by a combination of conifer forests and alas areas (forest-steppe areas).

The main part of the zone of insufficient moisture with warm summers (III 4) lies in the south of the European USSR and Western Siberia. Similar climatic conditions are also observed in certain mountain regions of the Caucasus and Soviet Central Asia. Characteristic of this zone are the black-earth (chernozem) and chestnut soils, supporting a diversified steppe and forest-steppe vegetation.

The zone of insufficient moisture with very warm summers (III 5) is represented by the comparatively small-sized areas of the south coast of the Crimea, central Transcaucasia, a part of the east coast of the Caucasus and by some foothill regions of Soviet Central Asia. This region has subtropical steppes, thin xerophytic forests and other species of xerophytic plant cover. A part of the territory is occupied by intra-zonal vegetation (the floodplain of the Terek).

All the climate zones with insufficient moisture are characterized by a comparatively small runoff coefficient, usually not exceeding 0.10 to 0.20. Because the total annual precipitation is less than the evaporability, the main part of the precipitation is expended on evaporation.

The climatic zones with an arid climate occupy the larger part of Soviet Central Asia and eastern Transcaucasia.

The zone of arid climate with moderately warm summers (IV 3), situated in the Pamirs, corresponds to the condition of high-mountain deserts. The zone of arid climate with warm summers (IV 4) covers the semi-deserts and deserts with a predominance of wormwood and saltwort vegetation. The conditions of arid climate with very warm summers correspond mainly to deserts with widespread saksaul growths, shrubs and ephemeral vegetation. In all the arid climate zones the soils are those typical of arid conditions: light chestnut, brown desert-steppe, gray-brown desert soils, gray soils, takyrs (clay flats) and certain other soils. The scanty precipitation in these areas is spent almost entirely on evaporation, and the runoff is usually close to zero.

In the climatic zones with insufficient moisture and in those with an arid climate the development of vegetation is largely determined by the soil humidity. As the soil humidity diminishes because of greater aridity, the possible amount of transpiration per unit area decreases to an even greater degree. This affects the character of the plant cover, with a dominance of xerophytes and areas bare of vegetation. As shown by observation data, the productivity of the natural plant cover varies considerably in all the climatic zones.

The amount of organic matter created annually by the natural vegetation per unit area grows as the moisture conditions approach the optimum, when the soil humidity level insures both abundant transpiration and good ventilation in the upper layers of the soil. According to available data, the optimum moisture conditions are observed when the moisture index is close to 1. With a fixed moisture index the productivity of the natural plant cover grows as the thermal energy resources increase, i.e., as the sums of the temperatures of the earth's surface increase.

The possible intensity of zoogeographic processes varies with changes in the productivity of the natural plant cover. The highest intensity of the whole complex of biogeographic processes in the USSR is noted in the areas with optimum moisture, very warm summers and mild winters. Such conditions are observed in certain regions of Transcaucasia.

The productivity of crops also varies perceptibly in the different climatic zones. However, its level depends essentially on agricultural technology, as well as natural factors. We know, for example, that reclamation produces high crop yields in areas with a natural plant cover of low productivity.

Most reclamation measures are aimed at changing the moisture conditions so as to bring them close to the optimum. For example, snow retention, the creation of shelter belts and irrigation are widely used to raise the soil humidity in arid regions.

In regions with excessive moisture, reclamation measures are designed to reduce the soil humidity (drainage, for example).

Our scheme of climatic regionalization of the USSR, based on a consideration of heat and moisture indices, can be used in appraising the climatic resources of the Soviet Union for the purpose of planning reclamation measures and solving other practical problems. However, this scheme gives only a generalized picture of the distribution of climatic zones in the Soviet Union. For many practical and theoretical tasks it is necessary to construct more detailed schemes of climatic regionalization, taking into account the influence of local factors and giving a more thorough characterization of the effect of relief on climate.

This work can be done by applying the above principles of climate classification after they have undergone some more detailed treatment.

In order to perform this work with the object of constructing detailed maps of climatic regionalization for separate parts of the USSR, it would probably be advisable to organize special studies along regional lines.

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Main Geophysical Observatory

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THE LOCATION OF THE BOUNDARY BETWEEN THE TROPICAL AND SUBTROPICAL LANDSCAPES IN EASTERN ASIA

(Based on material from a field study of Yünnan)

By D. V. Panfilov

(From Izvestiya Akademii Nauk SSSR, Seriya geograficheskaya, 1959,No.3 Pages 31-41).

The determination of boundaries between contiguous natural landscapes and the causes of the transition from one landscape to another is a most important task of geographic research. Knowledge of the causes of the transition leads directly to an understanding of geobiochemical and geobiophysical processes in natural landscapes that determine their qualitative characteristics.

Of equal interest is the study of boundaries of a higher rank not between individual natural landscapes, but between landscape complexes, which differ in thermic conditions and degree of moisture or a combination of these conditions. One such boundary is the one between humid tropical and subtropical landscapes.

There are few places where humid tropical and subtropical landscapes are contiguous. Both in the northern and in the southern hemispheres, the humid tropics and subtropics are usually separated by arid landscapes or by seas and oceans. In a few areas, the humid tropics and subtropics are in contact on the slopes of high, steeply rising mountains (in the Himalayas and Andes). This greatly complicates investigation because relief differences are added to the climatic differences between the tropical landscapes of the foothills and the subtropical landscapes of medium elevation. Relief in itself greatly affects many landscape components.

Central and South China is the only place where a "breakthrough" of tropical conditions in the direction of the subtropics occurs in a large area under conditions of low and uniform, though dissected, relief and humid climate. There are no broad water barriers and no obstacles in the form of deserts and steppes or high mountains. Eastern Asia provides well known examples of the penetration of various tropical organisms far toward the north, as far as the Ussuri Region and the Amur.

Biologists differ regarding the boundary between the tropical flora and fauna of the Indomalayan (Oriental) realm and subtropical-temperate Holarctic (or Palaearctic) realm. Without attempting to settle the question or dwelling upon a discussion of the views of the various authors, let us recall that there are at least three basic views:

(1) The whole of East China, the middle course of the Amur and the Ussuri Region are assigned to the Indomalayan realm (Bartenev, 1914; Kuznetsov, 1915, 1929, 1936, 1951).

(2) Northeast and Central China are assigned to the Holarctic realm, while South China is assigned to the Indomalayan realm (for example, Wagner, 1844; Semenov-Tyan-Shanskiy, 1936a,b; Vul'f,1944).

(3) The northern half of East China (to the latitude of the Yangtze or the Yellow River) is assigned to the Holarctic realm, while the southern half is assigned to the Indomalayan realm. This view is the most widespread (Martynov, 1924; Geptner, 1936; Puzanov, 1938; Shafer, 1956; Chang Jung-ts'u and Cheng Ts'o-hsin, 1957, and others).

It is striking that Shafer draws the floral boundary between the Paleotropical and Holarctic realm on the latitude of the Yangtze. But on the basis of plant cover, i.e., the landscape-forming aspect of vegetation, he draws the boundary between the tropics and subtropics much farther south, on the latitude of the Tropic of Cancer. The boundary between types of plant cover, determined on the basis of the numerically dominant species and life forms thus does not coincide with the floral boundary derived from an estimate of the whole systematic aggregate of plants without consideration of the number of specimens. The differing opinions of zoologists regarding the boundary between the Indomalayan and Holarctic realms are based only on an analysis of the systematic composition of the fauna and do not take into account the number of specimens or the role of the species in the geographic landscape.

At a later point we will try to explain the contradictions in the question of the location of the boundary under discussion. It is evident from the above that the question of the boundary between the regions of predominantly tropical and subtropical organisms, the basic components of landscapes, cannot be regarded as solved. Hence, the boundary between the tropical and subtropical landscape group is also unclear. It should be stated that any study of the flora and fauna of Central and South China is complicated by the long-standing dominance of cultural landscapes, resulting in the disappearance of natural plant and animal associations and of many species. One should therefore not expect to find here any examples of contacts between primitive tropical and subtropical landscapes.

However, somewhat farther west, in Yünnan, until recently an isolated and thinly populated part of China, there are still many examples of contact between tropical and subtropical landscapes. In this respect, Yünnan is of special scientific interest.

In 1956 and 1957 the author visited Yünnan as a member of a Chinese-Soviet expedition of zoologists and botanists. The field study lasted about half a year. Expedition members were able to familiarize themselves best with the areas of Kunming, Kinping, Hokow, Kingtung, Puerh, Szemao, Cheli, as well as a number of other places in southeastern and southern Yünnan more remote from the large population centers. Among the questions connected with a study of the natural conditions of Yünnan, the author was interested in the problem of the boundary between the tropics and subtropics.

A large part of the area under discussion is occupied by the Yünnan highlands with mean elevations of 1,800 to 2,000 m. above sea level. The southern highlands near the borders of Burma, Laos and North Vietnam are heavily dissected by rivers flowing south and southeast. Along the river valleys the elevations diminish sharply southward and reach 200 to 400 m. above sea level. The watershed ranges oriented in the same direction as the rivers also drop to the south and southeast from 2,600 to 1,000 or 800 m. On the southern edge of the Yünnan highlands the dissection of the relief is one of the principal causes of the diversity of natural landscapes.

In addition to relief, the movement of air masses plays an important role in the diversity of southern Yünnan. From May to October, southern Yünnan is under the influence of two flows of humid monsoons, the powerful Bengal monsoon and the weaker Tonkin monsoon. The Bengal monsoon, having left most of its precipitation on the western slopes of the Burma ranges, reaches Yünnan low in moisture. In southern Yünnan, especially on the mountain slopes, it still leaves a rather large amount of precipitation. Farther on, the Bengal monsoon passes over the Yünnan highlands and southeastern Yünnan as a high, rather dry air flow. This explains primarily the relative aridity of the Yünnan highlands, especially in the central zone running north to south through Kunming and across the upper course of the Hung Ho(Red River). While precipitation is 1,300 to 1,900 mm. a year in the valleys of southern Yünnan and on the mountain slopes of the southern edge of the highlands, it is about 600 mm. in the central zone. The Tonkin monsoon passes over North Vietnam at a low altitude, leaving the larger part of its moisture on the mountain slopes of southeastern Yünnan by the time it reaches the highlands, though still carrying more moisture than the Bengal monsoon. It is therefore chiefly the southeasterly winds that bring precipitation to the Kunming area in summer.

In general, three basic climates are formed in southern Yünnan:

1. The climate of the low-lying valleys, gorges and hills (below 900 to 1,000 m.) is hot, relative humidity in summer is very high, and fogs are frequent in winter. The mean annual relative humidity is 88 per cent. Rains are chiefly in the form of showers, and thunderstorms are frequent. Winter temperature drops are insignificant. In rare years the temperature in some nights drops to +2° or +4°C. The mean annual temperature is 23° to 25°; the lowest monthly mean about 18°. The annual precipitation is 1,300 to 1,900 mm.

2. The climate of the southern peripheral slopes of the Yünnan highlands (from 900-1,000 m. to at least 2,100-2,500 m.) is cool in summer, with temperatures 15 to 22°, and humid. There is a great deal of cloudiness, drizzles are constant, changing at times to downpours. In winter fogs are frequent, the temperature can drop to 0° and lower, especially on the higher slopes, where glazed frost, hoar frost and hail occur.

3. The climate of the southern Yünnan highland is determined by the relatively high elevation and its protection from the humid summer winds. In summer it is warm and moderately humid. There are many sunny days. In winter it is dry, warm and sunny in the day, with cold spells at night.

Thus, a strongly heated air layer fills the lower parts of southern Yünnan up to elevations of about 900m. In the direction of the equator this layer merges with the tropical air reaching in the valleys to approximately the same elevations in Burma, Laos and North Vietnam.

To judge from the temperatures, parts of southern Yünnan lying below 900 to 1,000 m. are undoubtedly tropical. The subtropics would be expected to lie at higher elevations. However, in order to establish the boundary between tropics and subtropics, it does not suffice to proceed from the climate alone, particularly not the temperatures and their annual distribution. It is also necessary to determine the plant and animal life of a given area. As we shall see below, the boundary between the tropics and subtropics of southern Yünnan is not determined solely by the sharp change in temperatures at elevations of the order of 900 to 1,000m.

Study of the basic landscapes of southern and southeastern Yünnan has led the author to conclude that the classification of these landscapes must be based on their association with relief forms. The largest units of such a classification are the landscape groups of valleys, river gorges and watersheds. Within these groups, differences between individual landscapes are connected with elevation. The specific elevation of the boundary between the tropical and subtropical landscapes is peculiar to each group; it does not necessarily coincide with the elevation of that boundary in other landscape groups. To illustrate, let us characterize the most common landscapes of southern Yünnan, without attempting to exhaust their entire diversity.

Landscapes of valleys and valley terraces

Foothill valleys (150 to 600 m. above sea level). These valleys are now largely occupied by ricefields. Natural landscapes have been preserved along the valley edges, on the terraces and adjacent gentle hill slopes. The climate is hot and frostfree. Summer precipitation is abundant, chiefly in the form of showers. Relative humidity in the rainy season is over 90 per cent. There are many sunny days. In the dry season fog and heavy dew are common at night, while in the day the relative humidity of the air drops to 40 or 50 per cent. Tropical forests of the mesophile type, tall-trunked, about 45 to 50 m. high, with many tiers. (The flora and vegetation of the foothill valleys and other parts of southern Yünnan have been more fully characterized in articles by An. A. Fedorov, I. A. Linchevskiy and M. E. Kirpichnikov (1956), and An. A. Fedorov (1957,1958).) Undergrowth and grass cover are poorly developed. Forest litter is missing. In the dry season the soil is covered with mud cracks. In addition to evergreen trees there are many deciduous species that lose their leaves in the dry season. But even in this period trees clothed with foliage predominate. In the dry season the surface of the ground is strewn with a layer of fallen leaves, which are destroyed intensively by termites. There are many woody vines and few epiphytes. Palms are not numerous. Ferns are unvaried. Common animals are monkeys (including gibbons), squirrel shrews, flying foxes, pangolins, leopards, squirrels, jungle fowl, parrots, bearded vultures, fruit-eating pigeons and, along the banks of rivers, water monitors. Gekkos and toads are active at night. There is an abundance of termites, ants, honeybees, darling beetles, cockroaches and crickets. The systematic composition of plants and animals is purely tropical, Indomalayan. There are few hydrophiles; mesophiles predominate.

Low-mountain valleys (700 to 900 m. above sea level), surrounded by low-mountain watersheds. The landscape is similar to that of the foothill valleys, but the temperatures are lower; the relative humidity in summer remains high. The rainy season has more overcast days and fewer showers, but drizzles are more frequent. Vegetation is very rich. The forests have more small palms, hydrophile herbs (bananas and plants of the arum and ginger families) and epiphytes than in the foothill valleys. Animal life is similar to that of the foothill valleys, but there are more hydrophiles. Wild elephants are encountered, and tree snakes and frogs are abundant; there are many land leeches.

Medium-mountain valleys (1,000 to 1,300 m. above sea level). Temperatures still lower, cool in winter, much fog. Some cold rains in summer; in March and April, hail followed by temperature drops of almost 10°, remaining at about 15° for many hours. Impoverished tropical forests occupy narrow terraces along the valley edges. On the hillside they are adjoined by subtropical forests: deciduous in the more humid valleys, coniferous and coniferous-deciduous in the drier ones. Figtrees abound and there are many vines. Tropical animal species predominate: bearded vultures, rhinoceros birds, peacocks and tropical insects, especially crypto zoic types, are common.

The valleys at the southern edge of the Yünnan highlands are thus occupied by tropical landscapes whose plant and animal associations are typically rich in the low-lying valleys and impoverished in the valleys above 1,000 m. Farther north, on the Yünnan highlands themselves, at 1,700 to 1,900 m., there is a considerable admixture of tropical elements among the subtropical fauna of a number of valleys. They include certain bugs, beetles, butterflies and birds in the areas of Kunming, Tsuying, Mitu and Mokiang.

River-gorge landscapes

Low-mountain gorges (200 to 900 m. above sea level). Soils are fine-structured, thin and filled with stony material on the bottoms of gorges. In many places there are sandstone, limestone, shale and granite outcrops. The climate is hot and frostfree. Relative humidity is very high in summer; winter is warm, and there is much fog and dew. The vegetation is richer than in other parts of southern Yünnan, and it is tropical. Evergreen plants predominate; the leaf fall is slight. The phenology of very many plants is unclear. The many-tiered tree cover includes hundreds of tree species and many large shrubs and herbs. Bananas, arum and ginger family plants are abundant. There are many lianas (woody and herbaceous) and epiphytes. Small palms are abundant; the larger ones include Livistona and Arenga. Many trees have plank-shaped roots. Animal life is purely tropical. Monkeys and parrots are found. There are many flying mice, squirrels, tree snakes and tree frogs. Large cats are common: tigers and leopards. Abundant among the insects are ants and termites, and there is a rich fauna of beetles, cockroaches, earwigs, crickets, cicadas and bugs. Butterflies are varied. Dragonflies are abundant. Organisms characteristic of the equatorial tropical forests of Southeastern Asia find in the low-mountain gorges the most favorable conditions of existence compared with those in other parts of Yünnan.

Low-lying medium-elevation mountain gorges (900 to 1,900m. above sea level). Temperatures lower than in the low-mountain gorges, but there are no frosts. There are more overcast and foggy days. The fauna and flora are in many ways similar to those of the low-mountain gorges, and somewhat poorer, especially above 1,300 to 1,400 m. Ferns are abundant and varied; tree ferns are characteristic. The tropical aspect of these gorges is quite evident.

High-lying medium-elevation mountain gorges (1,900 to 2,500 m. above sea level). Climate cool, fogs frequent. Thick , many-tiered tree cover. Many lianas, with woody ones predominant. A mass of epiphytes and mosses. Ferns abundant but no tree ferns encountered. No palms or pandanus. Such tropical trees as Schefflera are noted in the lower tiers; the herbaceous plants include tropical Acanthaceae. Plank-shaped tree roots are found. The trees include many wind-pollinated species, flowering in March to April, i.e., in the driest time of the year. Leaf fall, associated with the cold period, is more pronounced than in the lower-lying gorges. There are few termites or ants. Bumblebees , chiefly of the Holarctic group, are abundant. Among the many cryptozoic insects are many tropical ones (Brenthidae, Passalidae). In flora and fauna, these gorges occupy an intermediate position between the tropical watershed forests discussed below and the humid subtropical forests of the upper mountain slopes in the cloud belt. The landscape of high-lying medium-elevation mountain gorges is evidently transitional from the tropical to the subtropical. It is interesting to note the high penetration of tropical elements along the gorges. At altitudes above 2,000 m., gorges with tropical plants and animals are overlooked by watersheds on which the predominant plants are already characteristic of the temperate latitudes and the subalpine landscapes of Eurasia, such as the common bracken, strawberry, starwort, edelweiss, gentians, primroses, sphagnum, alder, deciduous oaks; the aspen is also found. An interesting inversion is observed in the high-lying medium-elevation mountain gorges: at the same absolute elevation the sunny slopes, being drier, are occupied by landscapes of a boreal character, while the shady slopes, being more humid, bear a tropical—subtropical landscape.

Watershed landscapes

Bamboo savannas (300 to 800 m. above sea level) adjoin the foothill valleys and the low-mountain gorges. Climate hot, frostfree; relative humidity high,especially in the rainy season. Plant cover unvaried. Huge bamboos 10 to 25 m. high predominate. Among the trees are figs, Gossampinus malabarica, Erythrina indica. Pandanus are encountered. Herbaceous lianas are abundant. Common animals are tigers, pangolins, jungle fowl, termites, ants (especially Oecophylla), large cicadas, dragonflies, beetles, flies, honeybees, bugs and crickets. In the damp season there are many land leeches. Flora and fauna are tropical.

Tall-grass savannas (700 or 800 m. to 1,200 m. above sea level), Climate hot, frostfree; relative humidity high in rainy season; dropping considerably in dry season. Little precipitation; showers rarer than in the foothill valleys; also fewer drizzles than on the higher-lying watersheds, situated in the belt of intensified condensation of atmospheric water vapor. Tall grasses predominate: Imperata, Themeda, Thysanolaena. Common trees are the Gossampinus malabarica, Eriolaena malvacea, Phyllanthus emblica, Ficus geocarpa, tree euphorbias. Animals include pangolins, jungle fowl and peacocks. There are many termites and ants. Large cicadas and various members of the locust family are abundant. Relatively xerophile species predominate among the animals. The tall-grass savannas, like the lower-lying bamboo savannas, now occupy a larger area than formerly because of the destruction of forests. Fires in the tall-grass savanna greatly impoverish its flora and fauna. To judge from the climate, vegetation and animal life, the tall-grass savannas are a tropical landscape.

Tropical mountain forests occupy the wet slopes of the watersheds from

1,100 to 1,800 m. above sea level. Climate moderately warm and even. In summer the air temperature stays within the range of 19 to 23°; drizzles and fogs are common. There are cold spells from December to February but the temperature seldom drops to 0°. The upper limit of the tropical mountain forests coincides with the lower limit of the clouds. Soils, of varying thickness, are represented by fine-structured and yellow soils; there are outcrops of colored shale and limestone. Forest litter is not found everywhere. The vegetation is rich. The trees of the upper tier, reaching a height of 40 to 45 m., often have plank-shaped and stilt-like roots. Subtropical trees predominate: Fagaceae (Castanopsis, Pasania), Schima, Lauraceae. Conifers are absent. Tropical groups predominate in the lower tier: bamboos, large-leaf shrubs, wild banana, large grasses abound. Wild tea is frequently encountered. Tree ferns are characteristic: in general, ferns are numerous. A common palm is the rattan (Calamus). Pandanus is common. There are many lianas and epiphytes: orchids are varied, the tropical epiphyte liana Epipremnum is abundant. Animals include the bearded vulture and other tropical birds; there are monkeys. Tree frogs and snakes abound. Termites are common, and there are many grasshoppers, crickets, earwigs, stick insects, beetles, dragonflies, flies and bugs. There are fewer ants and cicadas than in the lowland tropical forests. There are many land leeches and harvestmen; scorpions and large scolopenders are found under the bark of rotted trees. Along with tropical insects, there are many bumblebees. There are temperate and subtropical elements among the beetles as well. On the whole, however, the fauna is definitely tropical; some species are common to the lower-lying tropical forests; others are special tropical mountain species. The conditions necessary for the existence of the rich complex of tropical plants and animals reach close to their limit in the tropical mountain forests.

Subtropical mountain forests are situated above the tropical mountain forests, at elevations of 1,800 to 2,400 m. above sea level. In summer they are wreathed in clouds, and there are constant drizzles. In June and July the air temperature stays within the range of 17 to 20°. In winter there are fog, hoar frost and glazed frost, and snows occasionally. The soil is highly podsolized, and there is forest litter. Oaks and tree rhododendrons predominate; alder occurs occasionally. Woody lianas are abundant. A moss cover develops on the ground, on the trunks of trees and lianas, on branches and even leaves. There are many ferns and occasional selaginellas; begonias abound. There are many ground toadstool mushrooms. The conifers Pinus yunnanensis and Keteleeria appear in drier localities; there mosses and ferns diminish but lichens and club mosses increase. Animal life is not rich. Deer, tigers and leopards are encountered. Among the birds are pheasants. Common reptiles are snakes and agamas. Subtropical insects predominate. Termites are rare, and there are few dragonflies, butterflies and tropical beetles and ants. But there are many parasitic flies and ichneumon flies. Bumblebees and Carabus beetles of the Holarctic realm abound. The tropical insects are represented principally by the cryptozoics, in rotting wood and under the bark of dead trees. There is a distinctive subtropical flora and fauna at the boundary of the tropics and subtropics. There are similar landscapes elsewhere on the mountain summits of the peninsulas and islands of Southeastern Asia all the way to the equator. The close genetic connection between the humid subtropical mountain forests of Yünnan and the subtropical and even southern-temperate parts of Asia is unquestionable.

Coniferous subtropical forests occupy the watersheds in southern Yünnan and the Yünnan highlands from 1,200 to 2,000 m. and higher. Climate relatively dry, with cold spells in winter. Frosts occur. The relative humidity in summer is comparatively low. The well developed soils are covered with a layer of needle litter. Pinus yunnanensis and Keteleeria predominate among the trees, with an admixture of deciduous species: oaks, Schima, Gordonia and others. There are many shrubs, including rhododendrons. Grasses predominate in the undergrowth, and there are many ferns. Lichens abound on the ground in the Keteleeria groves. Animal life is represented principally by subtropical groups, but there are also a number of tropical ones. Termites abound. There are many tropical insects, living in dead tree trunks. Insects characteristic of the more northerly regions of Asia include Chalcophora (gold beetles), Spondylus (long-horned beetles), bumblebees and the Papilio machaon (sail butterfly).

The southern edge of the highlands, in the warmer and more humid climate from 1,200 to 1,600 m., has forests of Pinus insularis. Mixed with the pine are subtropical deciduous trees: Pasania, Castanopsis, oaks, birches. Cycads are characteristic. The herbaceous cover is well developed; grasses predominate. There are many termites among the insects. In general, the insects are principally tropical, common to the tropical forests. They include ants, butterflies (Papilio, Ornithoptera, Danaidae), cicadas, cryptozoic beetles, cockroaches and earwigs.

The aspect of the coniferous forests of Yünnan is subtropical; the tropical elements are subordinate. In the forests of Pinus insularis the number of tropical elements increases; these forests adjoin directly the tropical forests of the medium-elevation mountain gorges.

The tropical landscapes on the watersheds thus extend generally up to 1,200 m. Temperatures are high, the climate frostfree. There is an obvious moisture deficit in the dry season; in the rainy season the water drains rapidly into the neighboring gorges and valleys. In spite of the high temperatures, the tropical flora and fauna are therefore poor because they lack the hygrophiles and mesophiles characteristic in Southeastern Asia. The savannas have only a few mesophiles with features of xerophilism, making the plant and animal life monotonous, especially in the tall-grass savanna. There is richer plant life in the bamboo groves of depressions, where more moisture is available.

Above 1,200 m. the savanna is in many cases replaced by subtropical conifer forests on the watersheds. The tropical vegetation, while tolerating aridity at high temperature, is apparently incapable of existing under drought and low-temperature conditions and is replaced by subtropical evergreen or deciduous species, which cope more successfully with physiological dryness. The essence of this phenomenon consists in the fact that during a temperature drop the biologic processes, particularly those maintaining a normal quantity of water in the organism, decline much more intensively than the rate of water loss resulting from the purely physical process of evaporation. Hence, with lowered temperatures even above 0^{o}, organisms begin to lose the water in their tissues. Characteristic of true tropical organisms that deal only with high temperatures is the absence of suitable adaptations preventing physiological dryness. Subtropical plants and animals offer stronger resistance to the penetration of physiological dryness. In plants, this manifests itself in the strong suberization of the bark and in the dropping of leaves or the dying of the above-ground parts in the winter; and in many invertebrates, in the association with the cold season of the phases of ontogenesis that develop defense mechanisms against evaporation (dense envelopes of eggs and pupas, cocoons, etc.). Many vertebrates and invertebrates use covers with high moisture content, such as soil, litter, burrows and passages in wood, for protection against evaporation.

A different picture exists on the high watershed sections, in the zone of high humidity where humid air currents reach the southern edge of the highlands. There, in spite of the low temperatures and because of the great humidity, the tropical complex is richer than in the savannas and can be traced to about 1,800 m. Under high-humidity conditions, chilling to almost 0^{o} to all appearances does not harm tropical organisms, although many plants and animals of the tropical lowland forests are missing in the tropical mountain forests and the participation of subtropical species increases. In the tree tier, subtropical groups already predominate, whereas the plants of the lower tiers, the epiphytes and most insects, are tropical. The trees at these altitudes are subjected to the greatest physiological dryness when temperatures are low, whereas the organisms under their shelter are protected from physiological dryness in the immobile and humid forest air. These forests are subtropical from the viewpoint of species composition; from the viewpoint of the undergrowth and epiphytes, they are unquestionably tropical. But the biocoenotic structure of these forests and the life forms of the trees that are subtropical in their systematic position are close to the true tropical species. Above the tropical mountain forests, at altitudes where the temperature is low in the summer but where there are frosts in winter, subtropical deciduous forests appear. There not only the tree tier, but also the undergrowth and animal life become mainly subtropical. There are few tropical elements.

On the watersheds with warm climate, the boundary between tropics and subtropics thus lies at rather low elevations, but on well moistened slopes it rises to about 600 m.

The boundary between the tropical and subtropical landscapes also depends upon the humidity in other relief forms. In the valleys, where the humidity, is generally higher than on the watersheds, tropical organisms dominate even in relatively dry localities up to 1,300 m. In the gorges, marked by a still higher amount of moisture in the subsoil, soil and air, tropical organisms are distributed up to altitudes of about 1,900 m., and many even up to 2,400m. A general law is evident: under frostfree-climate conditions tropical elements tolerate cool conditions when the environment is very humid and do not tolerate them when it is dry. This applies to plants and many invertebrates. With other animals capable of defending themselves against a moisture deficit and low temperatures (by dense covers, heat regulation, behavior, change in the character of feeding, etc.), this law is not very clearly pronounced; the chief dangers for them are apparently frosts, i.e., conditions in which tropical plants and animals are unable of defending themselves against physiological dryness and cannot long survive. Frosts do reach these climatic limits, but disappear already under conditions of a frostfree subtropical climate with a dry cool season.

Thus, the boundary between the distribution of tropical and subtropical organisms reflects the phenomenon called physiological dryness.

Certain tropical animals that do not fear physiological dryness still do not penetrate into the subtropical regions because of a generally heavy change in the biocoenoses. In these cases climate has only an indirect influence upon the animals, especially through the vegetation, inasmuch as the microclimate and the feeding and shelter conditions change.

In view of the above considerations, attention must be directed to the fact that various groups of organisms, resisting physiological dryness in different ways, have different boundaries of distribution between their tropical and subtropical representatives. That is why there is no agreement among investigators regarding the boundary between the tropics and subtropics. Best pronounced is the boundary in the case of arborescent plants and phanerozoic insects, coinciding with the boundary of constantly warm climate. Organisms associated with humid habitats and with the lower tiers of the plant cover penetrate much farther into the subtropical climate: among these plants are some lianas, many epiphytes, herbs, shrubs; among the animals, cryptozoic invertebrates. Many vertebrates of the tropics of Southeastern Asia for which the restoration of moisture in the organism is not a problem are distributed far to the north. Hence, the boundary of distribution of tropical vertebrates lies in the region of the Yangtze, i.e., near the boundary between subtropical and temperate climates. Many tropical insects whose larvae develop in the water also advance far northward. Such are the dragonflies, May flies and mosquitoes. They reach northward from the tropical regions to the Amur and Ussuri regions, which causes their fauna in East China to be regarded basically as tropical.

Yünnan has a meandering boundary between the tropics and the subtropics. The tropics penetrate northward along the depressions; the subtropics southward in elevated terrain. This meandering boundary does not coincide with the upper level of the tropical air, which usually reaches elevations of 900 to 1,000 m. Because of the varying resistance of tropical and subtropical organisms to physiological dryness, the boundary occupies a higher location in the valleys and gorges than on the watersheds, and the difference in the elevation of the boundary may amount to 700 m.

In general, it should be noted that both in Yünnan and on the more extensive territory of East Asia the penetration of tropical organisms into the area with subtropical climate is effected more easily than that of subtropical and temperate organisms into landscapes with hot and humid climate. The main obstacle is high air temperatures, harmful to subtropical organisms. Overheating may play a certain role, since the resistance of subtropical organisms to drying does not permit them to lower their body temperature efficiently enough by transpiration under the high-humidity conditions of the tropical regions. Apparently, it is easier for tropical organisms to find the necessary moisture conditions at low temperatures than for subtropical ones to protect themselves against high temperature in the humid air, inasmuch as greater homogeneity is usually observed in the temperatures of a locality than in the distribution of moisture. In Yünnan very few subtropical plants and animals descend through the shady gorges to 600 or 700 m. (for example, willows and bumblebees). The penetration of subtropical organisms into the tropics is greatly impeded by the tenseness of the biocoenotic relationships in the tropical landscapes, which differ from the subtropical and temperate landscapes in that the niches of the biocoenoses are filled to a greater extent.

In conclusion, we must touch on the question whether the boundary between the tropics and subtropics is a "break" or a "transition", i.e., whether landscapes alien to each other meet here or whether some sort of transformation takes place between the tropics and the subtropics. Apparently, both of these things happen. For true subtropical-temperate organisms this boundary acts as a barrier, which very few of them surmount.

For many phanerozoic tropical organisms this boundary is also a barrier, primarily for arborescent plants, a major component of the tropical landscape. For other tropical organisms this boundary is only a slight obstacle, surmountable both by species and by groups in the process of evolution. In structure and composition, the tropical and subtropical landscapes of Yünnan are not so much related to each other as they contrast with each other. The boundary between the tropics and subtropics is rather sharp. The considerable difference between the tropical landscape groups on the one hand and the subtropical groups on the other indicates a long evolution mainly independent of one another. The peculiar directions of this evolution were governed primarily by the specific effect of the tropical and subtropical climates upon the organisms. However, this does not exclude the possibility that in the distant past, under other geographic circumstances, the tropical and subtropical organisms had common ancestors. This is indicated by the similarity between these organisms with respect to the systematic units of high rank: families, orders and classes. The main landscape-forming tropical and subtropical organisms in Eastern Asia do not cross the boundary between tropical and subtropical climates, which in China lies on the latitude of the Tropic of Cancer. Many groups of organisms characteristic of the tropics, though they cross this boundary, are in most cases represented north of it by a smaller variety of species and a smaller number of specimens. A number of tropical species that have crossed the climatic boundary between the tropics and subtropics have, in the process of evolution, acquired adaptations uncharacteristic of the inhabitants of the tropics, thus insuring their existence in climates with protracted and considerable drops in temperatures.

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THE FORTHCOMING CONGRESS OF THE GEOGRAPHICAL SOCIETY OF THE USSR AND ITS PROGRAM

(From *Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya*, 1960, No. 1, Pages 3 - 12).

The Third Congress of the Geographical Society of the USSR will meet in Kiev, January 30 to February 7. In accordance with the Society's Charter, the Congress is being convened exactly five years after the Second Congress. The Third Congress will hear and discuss a report on the activities of the Geographical Society during the 1955-60 period and will elect a new president, a new Council and a new Auditing Commission. In addition, there will be a report of the National Committee of Soviet Geographers on the development of international ties in the field of geography and a discussion of preparation for the 19th International Geographical Congress meeting in Stockholm in August, 1960.

The Third Congress will also hear a number of scientific papers on major theoretical and practical problems of Soviet geography relating to decisions adopted at the 21st party congress. The broadly representative assemblage of Soviet geographers will thus be utilized for public discussion of the current state of Soviet geography and its principal lines of future development.

The Organizing Committee of the Third Congress has proposed a new procedure for conducting the sessions. In order to insure a productive meeting, the committee has limited the number of topics for discussion to the most important problems facing Soviet geography today, giving priority to problems of an integrated character that would enlist the knowledge of specialists in a wide range of geographic disciplines. In order to make possible a full discussion of these problems, it was decided to prepare a limited number of preprinted papers and to spend most of the time of the Congress in discussion of these papers.

The Division of Geological and Geographical Sciences and the Presidium of the Academy of Sciences of the USSR adopted these proposals as well as the range of topics to be included for consideration by the Congress. In accordance with their directives, the Organizing Committee has worked out the procedure to be followed at the Congress as well as the topics of the preprinted papers.

The Congress is expected to conduct its work in six more or less independent symposia. Each of these symposia will begin its work in a plenary meeting of the Congress, but will discuss its papers within the framework of commissions or sections that will operate either independently or in conjunction with other symposia.

The principal problems to be handled by separate symposia are the following:

(a) the role of geography in the study, utilization, conservation and restoration of the natural resources of the USSR;
(b) problems of the country's economic regionalization;
(c) natural (physical-geographic) regionalization for agricultural purposes;
(d) problems of the heat and water balance of the earth's surface;
(e) the general theory and practical application of landscape-study methods;
(f) the status of geography in secondary and higher educational institutions in relation to the reform of secondary and higher education.

Let us examine these problems in detail.

We know that the geographical sciences at the present time, in contrast to their earlier stages, no longer stress the study of little known, remote areas but rather well known areas and countries with a large and dense population, well developed economy and a profoundly transformed natural environment. The principal aim of Soviet geography is therefore to assist the national goal of making full and intensive use of natural resources and to transform the natural environment of the country. In other words, geography is now charged with one of the key tasks of modern times -- the systematic study of the principal natural resources of the country, the determination of their present level of utilization and the formulation of rational methods for their future utilization, conservation and restoration.

By listing the problem of the study, rational utilization, conservation and restoration of natural resources as the topic of its first symposium, the Third Congress is thus in keeping with the general trend of Soviet geography's maintaining closer links with practical needs and with the requirements of the national economy.

The symposium will first consider an introductory paper posing the problem as a whole and in its major aspects. The paper will stress the mapping of natural resources as a basic method of generalization of geographic knowledge about the country's resources. This topic will be treated in greater detail in a paper to be given by the Main Administration of Geodesy and Cartography.

Climatic resources will be discussed in a paper presented by the Main Geophysical Observatory from the point of view of their characteristics in the various parts of the Soviet Union, the degree to which they have been studied, methods of further study and improved ways of using climatic resources for agriculture. The main subject of study is the varying degree of correspondence between water and heat resources, depending on zonal and regional characteristics, the possibilities of their effective utilization by agriculture and man's efforts to achieve a guided transformation of climatic factors.

Water resources and their links with climatic factors will be the subject of a special paper. Water resources are known to be of importance for power generation, transportation, water supply and irrigation. These various uses often conflict with one another, especially in large river-basin developments. The way of insuring a harmonious, integrated utilization of water resources satisfying all needs provides one of the most challenging geographic problems, which will also be opened for discussion.

Of considerable importance in the symposium will be a paper on the study and improved utilization of land resources. Geographers already have a good deal of experience in that field. The papers on that problem, to be presented by a group of research institutions, will not only characterize the present condition of Soviet land resources but report on completed and planned studies of a geographic character.

Finally, there will be two papers on biogeographic themes: one on vegetation and another on animal life. Most of the vegetation paper will be devoted to forest and fodder resources, but it will also deal with other industrial and pharmaceutical plants.

All these papers will describe the present state of natural resources, give a qualitative appraisal of their national importance, bring out the degree to which they have been studied and make general recommendations for improving methods of studying, surveying, appraising, utilizing, conserving and restoring natural resources. The specific aspects of individual natural resources will undoubtedly be discussed; however, the principal emphasis will be on the role that geographic institutions can play in this field.

In addition to the above-mentioned papers, the first symposium will also discuss a regional paper on the natural resources of the Ukraine. There is ample justification for singling out the Ukraine because Ukrainian geographers will be the hosts of the Congress and the Ukraine has accumulated considerable experience in the study of natural resources. This applies especially to the Ukraine's improved soil-survey methods, land appraisals and land-use studies. A separate paper will be devoted to the role that geography can play in conservation (again on the basis of the Ukrainian experience).

In the period between the Second and Third Congresses, there has been a considerable intensification of economic regionalization studies, due largely to the scientific and practical significance of the subject. Economic regionalization is the central theoretical problem of economic geography. The level of advance of economic geography and its direction of development depend on the degree to which that problem is being worked out. There is complete unanimity among Soviet scientists regarding the basic principles of economic regionalization. But when it comes to specific problems, such as methodology of regionalization and specific regional schemes, there are wide divergences of views. The time has come to have a broad exchange of opinions on all these problems. The Congress of the Geographical Society provides the best forum for such a discussion. Such a discussion is needed all the more because economic regionalization in the Soviet Union is not only of perceptional importance but plays a major role in the planning of the national economy with the aim of insuring the most rational distribution of productive forces in the country as a whole and in its parts.

It is quite evident that the symposium on economic regionalization will offer no opportunity for, and actually will not require, a discussion of all aspects of economic regionalization studies carried out in the USSR. It will be quite sufficient to summarize the results of the work done in that field since the last Congress. The symposium will therefore open with a paper on the current status of economic regionalization studies in the USSR. It is hoped that the discussants will supplement the paper with reports on economic regionalization work in the various geographic centers.

The symposium must, however, concentrate its attention on those economic regionalization studies that are of the greatest current importance. They are the studies dealing with a general economic regionalization of the Soviet Union and the establishment of economic regions within oblasts.

A long-term plan for the development of the Soviet economy is now in process of being drafted. The drafting of any economic plan, and especially one for such a long period, cannot be carried out without planning by territorial units and the delimitation of major economic regions. There is hardly a scientific problem that has absorbed the interest of Soviet economic geographers to the extent of the problem of the general economic regionalization of the USSR.

Many economic geographers are working on that problem. But it is obviously handled most effectively by large study groups that have all the necessary data and processing facilities at their disposal. Representatives of such study groups will tell the symposium about the methodological principles they have been using in delimiting major economic regions and about the regional schemes worked out on that basis.

Since the Congress will be meeting in Kiev, it is quite natural that these series of reports will include one on the economic regionalization of the Ukraine, which is the second most important Soviet republic after the RSFSR.

All these reports will serve as the basis for a full discussion of the entire problem of general economic regionalization of the Soviet Union.

Of major current interest is the problem of the delimitation of economic regions within oblasts, krays, autonomous republics and union republics having no oblast breakdown. In most cases that problem is concerned with the internal division of economic administrative regions now being used for the management of industry and construction. The delimitation of internal industrial complexes within these economic administrative regions would greatly assist the operations of the regional economic councils and the planning agencies of oblasts, krays, autonomous republics and union republics.

While the problem of the general economic regionalization of the USSR is one that is best handled by large study groups, the problem of delimiting economic regions within oblasts is one that can be left to individual geographers. In fact we have quite a number of published studies in which a small group of authors or even individual authors have successfully devised an economic regionalization of a given oblast or republic. Suffice it to mention the series of monographs on union republics and major economic regions of the RSFSR, published by the Institute of Geography of the Academy of Sciences of the USSR or by local institutions with the help of the institute's staff members. We have also a number of local publications devoted to individual oblasts, krays and republics and delimiting internal economic regions. We can say without exaggeration that studies on the delimitation of economic regions within oblasts are among the most common types of economic-geographic studies dealing with the economic regionalization of the USSR. The time has now come to generalize the findings of all these studies and to exchange opinions on what has been achieved and what remains to be done. Although there has undoubtedly been progress in this field, the methodology of such regionalization does not seem to be adequately developed. Many points are still unclear and there is a divergence of views. The Congress should be used to discuss the matter, and a special paper will be given for that purpose.

There has been a noticeable increase recently in studies on the geography of population in the USSR. Unfortunately these studies have not reached the level where population geography could be singled out as one of the few major topics at the Congress. However, any studies in economic regionalization must take account of manpower resources, the role of large cities and other problems of population geography. The symposium will therefore consider a special paper on the role of population geography in the economic regionalization of the USSR. This will make it possible, on the one hand, to discuss this key aspect of economic regionalization and, on the other hand, to introduce major problems in the field of population geography.

The symposium on natural regionalization for agricultural purposes will discuss several basic papers. The work of that symposium will be of special interest in view of the decisions reached at the last party plenum with regard to agriculture.

A group of staff members of the Council for the Study of Productive Forces and of the Soils Institute of the Academy of Sciences will present a paper giving a new bioclimatic and soils regionalization scheme for the USSR. The scheme is based on the theory of world-wide soils and climate belts and regions (facies) as the basic forms of the world-wide soils zonality law formulated by V. V. Dokuchayev.

The basic taxonomic units in that scheme are the zone under lowland conditions and the vertical structure or mountain province under upland conditions. The combination of zones and vertical structures into biological and soils regions and biological and soils belts has yielded a new ascending branch of the taxonomic system of regionalization.

At the same time, each biological and soils zone represents a geographic macro-association containing associations of lower orders that form a descending branch of the taxonomic system of biological and soils regionalization.

The territory of the USSR has been divided into 5 belts, 13 regions and 71 bioclimatic and soils provinces in lowland zones and into 36 mountain provinces. Regional bioclimatic and soils maps make it possible to identify areas with the most favorable conditions for major crops or livestock types and to take better account of geographic conditions in cropping systems.

A paper on physical-regional regionalization of the USSR for agricultural purposes will report on work done by the geography faculties of universities and some other higher educational institutions. It will describe the scope, the principles and the methodology of the work done and display the results of the work in the form of regional schemes for various parts of the USSR and over-all schemes covering the European part (including the Caucasus) and Siberia (including the Far East).

The concluding part of that paper will list the publications that have emerged from this work. The paper makes clear that at the present stage of physical-geographic study of the territory of the USSR, regionalization must resort to various methods involving mutual control of the results obtained. However, the basic method that has been adopted involves the delimitation of regions on landscape-type maps. The system of taxonomic units (proceeding from the largest to the smallest) is as follows: country – zone (within the country) - province (oblast) - subzone (subprovince in the case of mountains) -okrug (if needed) - rayon. If needed, there can be an additional breakdown into subrayons.

A paper on the agroclimatic basis for the distribution and specialization of agricultural production will cover the results of studies carried on in recent years in the Academy of Agricultural Sciences named for Lenin, the Hydrometeorological Service and the Council for the Study of Productive Forces of the Academy of Sciences USSR. In appraising climatic resources for agricultural purposes, these studies have taken account of the supply of heat and moisture in the growing season as well as the wintering conditions of farm crops. Methods of calculating the variability of agroclimatic indices over time have made it possible to determine average yields over a period of ten years for any given crop in any part of the USSR. The same methods, taking account of changes in relief, soils and cropping techniques, have made it possible to make an agroclimatic estimate for any area down to farm size.

A paper on the present distribution and specialization of agriculture in the USSR will discuss the principles of compilation and the contents of the map of agriculture of the USSR at 1:4,000,000 published by the Main Administration of Geodesy and Cartography. The new map shows the distribution and specialization of agriculture as of the start of the current seven-year plan (1959). It also reflects prospects of development of agriculture by the end of the seven-year plan.

A paper on cropping systems in various natural zones of the USSR and the related tasks of Soviet geography will present the results of cropping-system studies done by the institutes of the Academy of Agricultural Sciences named for Lenin and by the Ministries of Agriculture of the USSR and the union republics.

A group of Ukrainian geographers from various universities and teachers colleges has been engaged in a major project on physical-geographic regionalization of the Ukraine. The project is basically designed to meet the needs of agriculture, but can also be used for determining the distribution of other sectors of the economy as well as for teaching purposes. In delimiting geographic belts and sub-belts, the authors stress the leading role of the radiation and heat balance and of the basic types of atmospheric circulation. Within the belts, they distinguish zones characterized by distinctive soil and vegetation landscape types associated with various moisture conditions. The belts and zones in turn are broken down into sub-belts and subzones on the basis of more refined indices of the heat and water balance, which also determines the division of soil and vegetation types into subtypes. The country as a whole is regarded as a superior azonal unit. A province is regarded as part of a zone and is delimited on the basis of the degree of continentality and the character of the circulation and transformation of air masses. This brings about certain intrazonal differences in the soil and vegetation cover. In some cases the province is delimited because of a distinctive history of landscape development.

The map of the physical-geographic regions of the Ukraine will also show administrative oblasts and rayons.

It will be evident from the foregoing summary of papers that the symposium on natural (physical-geographic) regionalization will stress agreement between the various regional schemes and the principles and methodologies used in constructing them. The principal criterion in the discussion will be the suitability of the regional schemes for agricultural needs.

The symposium on the heat and water balance of the earth's surface will be designed to examine the present status of the problem, to assess its importance for the theory of physical geography and to map out future studies, especially those of current interest to the national economy.

This symposium will include two groups of papers. The first group consists of papers (submitted mainly by the Hydrometeorological Service) dealing with the present status of studies of the heat and water balance. The other group consists of papers examining the results that the use of water-and-heat balance studies can yield in investigations of processes of soil formation, the development of the vegetation cover, the theory of physical-geographic zonality and the planning of measures designed to transform nature. A paper on the last point will be given by a group of Ukrainian institutions.

The journal Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya has repeatedly published articles on this problem (see 1956, No. 4, and 1959, No. 5). The present report therefore does not have to go into the circumstances relating to its origin. Suffice it to say that the problem of the water and heat balance of the earth's surface, its role in the dynamics of natural processes and methods of transforming the balance for practical needs constitutes within the program of the Academy of Sciences of the USSR one of the key study efforts of Soviet science requiring special coordination of work done in various quarters. It is to be hoped that the organization of a special symposium at the Congress will contribute to the further development of studies in this field.

Another major symposium on physical geography will be devoted to the general theory and practical application of landscape-study methods.

We know that the earth's surface in the course of its natural development has been broken down in a multitude of sections distinguished one from the other in the association of many interrelated external features and internal characteristics. These sections have been called geographic landscapes. Their objective existence and the need for perceiving them have given rise to the development of a special scientific approach in physical geography, namely the theory of geographic landscapes, or landscape studies. The study of natural geographic landscapes is also of practical interest because man's economic activity does not take place in a geographic(natural) environment in general but in specific geographic landscapes.

Differences among landscapes presuppose differences in the possibilities and ways of economically developing such landscapes. Without thorough study of the internal structure of landscapes, there can be no rational transformation of nature because if man wants to transform a landscape by acting on one or several of its components he must first know how the other interrelated components will be transformed.

The theoretical concepts of landscape studies have more or less crystallized by now although they are still not completely free of contradictions and obscurities. Many Soviet physical geographers feel that these shortcomings can be eliminated only through a broad program of field studies, discussion of the results of such studies and the cartographic expression of such studies in the form of landscape maps. An exchange of opinions on landscape mapping would therefore seem to be especially useful; it may contain the key to the solution of several major theoretical and methodological problems in landscape studies as well as to the correct use of landscape maps and descriptions for economic purposes. The foregoing will explain why the symposium on landscape studies, in addition to a survey paper on the present state of landscape studies, also provides for a paper on landscape mapping, its importance, present status and prospects.

We know that geographers study natural landscapes by using methods of the natural sciences. Some of these methods have become traditional in landscape studies and will probably continue to be used. However, with advances in physics and geochemistry, new methods based on these two disciplines are gradually being used in the study of natural landscapes. So far the process has been slow. Not all geographers accept the usefulness of the new methods and, what is more important, not many geographers are able to use the new methods. Study methods are now playing a decisive role in the development of sciences. The adoption of new methods opens new horizons and stimulates scientific development. The paper on the use of physical and geochemical methods in landscape studies is therefore quite appropriate in the landscape-study symposium. Specialists using the new methods will be able to discuss the value, the forms and the limits of application of the new methods.

Another paper in the program, dealing with landscape field studies in the Ukraine, will highlight the landscape-study problem with the example of a specific region.

Geographic education and the training of young geographers are of major importance for the development of geography. The Congress has therefore set aside a special symposium on geographic education in relation to the recent school reform.

The symposium is expected to discuss the following problems:

(1) the new law on higher education and the tasks of college-level geography; (2) the law on the reorganization of public education and the

tasks of geography in secondary school; (3) the draft program for geography in the secondary schools of the Ukraine; and (4) the present status and the tasks of home-area studies.

In connection with the reorganization of economic management on the regional principle and the establishment of regional economic councils, geographers now face additional tasks in assisting the national economy with the study and surveying of natural resources, the rational utilization of such resources and the integrated development of the productive forces of administrative economic regions and centers of concentrated industrial construction. Such geographic work can be of benefit to agriculture as well as to industry and construction.

The present state and tasks of geography relating to the needs of the national economy require uniform development both of its synthesizing disciplines (physical and economic geography, cartography and regional geography) and of its particular disciplines (geomorphology, climatology, oceanography, hydrology, glaciology and permafrost studies, biogeography, soil science, the geography of population and the geography of specific sectors of the economy). Advances in the particular disciplines contribute to a large degree to the significance of the synthesizing work of geography. However, the study programs in geography in most of the Soviet universities do not fully meet these basic requirements and are still not adequately related to practical needs. They still reflect the old concept of geographic education, when universities trained almost exclusively secondary-school geography teachers.

Serious attention should also be given to the training of geography teachers in universities and the biology and geography faculties of teachers colleges.

The legitimate concern of all geographers is being aroused at the present time by the status of geography in secondary schools. Compared with the great spurt that followed the party's 1934 directive on the teaching of geography in secondary schools, the situation has now greatly worsened. The number of class hours in geography has been reduced, and the former programs and textbooks written by N. N. Baranskiy and I. A. Vitver, used for almost a quarter century by our youth, have given way to programs and textbooks of inferior quality. The present status of geography in the secondary schools is far from meeting the requirements of the school-reform law, especially its provisions of bringing school closer to productive life. Our secondary schools recently have not been giving our youth enough knowledge about the development of the natural environment, about the significance of natural and economic conditions in the development of the national economy and especially not about their home district. In addition to raising the importance of geography in public education and improving the quality of programs and textbooks, geography teachers must also be able to organize and develop home-area studies, both as a study subject and an extracurricular activity.

The marshaling of the great number of secondary-school geography teachers for government-sponsored and voluntary home-area studies, including the surveying, rational utilization, conservation and restoration of natural resources, and the participation of students in this program may become a key factor in strengthening the position of geography in the schools.

These considerations brought about the inclusion of a special paper on home-area studies in the symposium on geographic education.

Such are briefly the problems included in the program of the Third Congress of the Geographical Society. As stated above, the papers submitted on each of these problems and to be made available at the opening session of each symposium should contain enough material for discussion. However, there is no doubt that the discussion will range beyond the specific problems touched in the papers. In addition to adding supplementary information about their own areas, the discussants will undoubtedly make critical observations regarding the present status of the problems under discussion, make methodological suggestions and offer constructive proposals for future studies. An important part of the Congress will therefore be the careful analysis of the discussion and the formulation of resolutions that will serve as a directive from the geographic community to the Geographical Society of the USSR, the geographic institutions of the Academy of Sciences of the USSR and the geography faculties of universities and teachers colleges.

It is quite clear that the basic content of that directive will be a demand to strengthen the ties between Soviet science and Socialist practice and to concentrate all geographic efforts on the fulfillment and overfulfillment of the directives of the 21st party congress and on the speedy construction of a Communist society in the USSR.

Soviet geographers pledge all their efforts for the realization of these objectives.

Bureau of the Organizing Committee
of the Third Congress of the
Geographical Society of the USSR

THE THIRD CONGRESS OF THE GEOGRAPHICAL SOCIETY OF THE USSR

(In the current issue, Soviet Geography begins the publication of papers preprinted for distribution at the Third Congress. The preprints were made available to Soviet Geography through the courtesy of Aleksey P. Polezhayev, an exchange student from the Geography Faculty of Moscow State University, who is spending the academic year 1959-60 at Columbia University).

REPORT ON THE ACTIVITIES OF THE GEOGRAPHICAL SOCIETY OF THE USSR IN THE PERIOD 1955-59

A number of outstanding events took place in the life of the Soviet Union in the last five years. They included the 20th and 21st party congresses, at which plans for the economic and cultural development of the country in 1956-60 and 1959-65 were approved; the reorganization of the management of industry on the regional principle through the establishment of regional economic councils (sovnarkhozes), and the reform of secondary and higher education. Each of these events touched the field of geography directly or indirectly, pointing out new directions of advance and of practical applications. It was therefore natural that the Geographical Society of the USSR tried to conduct its activities so as to insure, with the means at its disposal, the highest possible development of geographical science and the most fruitful links between geographers and the country's needs. That approach is also reflected in the selection of problems to be discussed at the Third Congress of the Society.

Following is a short account of the activities of the Geographical Society of the USSR since the last Congress.

Membership of the Governing Bodies

The Council of the Geographical Society of the USSR had the following membership in 1955-59: A. I. Andreyev, N. N. Baranskiy, M.I. Budyko, V. Kh. Buynitskiy, V. A. Varsanof'yeva, Ye. Ye. Voronov, Ya. Ya. Gakkel', I. P. Gerasimov, A. A. Grigor'yev, F. F. Davitaya, A. V. Darinskiy, L. A. Demin, N. V. Dumitrashko, V. Ye. Yegor'yev, I. D. Zhongolovich, S. V. Kalesnik, N. G. Kell' , O. A. Konstantinov, K. K. Markov, E. M. Murzayev, D. V. Nalivkin, S. V. Obruchev, B. P. Orlov, Ye. N. Pavlovskiy, I. D. Papanin, L. Ye. Rodin, K.A. Salishchev, Yu. G. Saushkin, B. N. Semevskiy, N. N. Sokolov, A.I. Solov'yev, V. B. Sochava, N. N. Stepanov, S. P. Khromov, Ye. Ye. Shvede, Z. Yu. Shokal'skaya, A. P. Yushchenko, or a total of 37 persons. D. L. Armand was a candidate member. The Council met thirteen times during this period.

The Presidium of the Society was made up as follows: Ye. N. Pavlovskiy - president; I. P. Gerasimov and S. V. Kalesnik - vice presidents; Ye. Ye. Voronov - secretary; V. Kh. Buynitskiy, O. A. Konstantinov, B. P. Orlov, L. Ye. Rodin, V. B. Sochava, Ye. Ye. Shvede and Z. Yu Shokal'skaya - presidium members. The presidium met 28 to 32 times a year.

Organizational Network of the Society

The Second Congress recommended further expansion of the Society's network of branches and sections. Since the last Congress the Society created five new branches (Bashkir, Buryat, Dagestan, Lithuanian, Estonian) and 27 new sections. The number of local organizations has increased as follows in recent years:

	1947	1954	1959
Branches	9	19	24
Sections	14	58	84

As of January 1, 1960, the Society consisted of its central organization, 24 branches, 56 sections within branches, 28 sections outside branches, and 16 sub-sections within sections, or a total of 125 organizations.

In addition, several branches and sections contained a total of about 20 small regional cells. Experience has shown that such cells can after some time be converted into sections, as has happened, for example, in the case of the Bryansk, Kursk, Lipetsk and Smolensk cells of the Moscow branch.

The list does not include several organizations that still exist formally but have actually ceased their activities. They are the Mari branch and the Birobidzhan, Svobodnyy and Lower Amur sections, which ceased their activities in 1950. In addition the independent Tashauz section was merged in 1958 with the Chardzhou section.

The rapid growth of local bodies is due to the initiative of both the Presidium and the local people. Of the 56 sections within branches, about 40 were set up by the branches themselves.

The Presidium has done much to consolidate the structure of the local organizations. Some of its steps were of a purely jurisdictional character. For example, the Kazan' section, consisting of a large membership and being situated in an autonomous republic, had all the requirements for conversion into the Tatar branch. The Dagestan section, originally set up with the support of the Azerbaydzhan Geographical Society, has been converted into a separate branch. Most of the consolidations were designed to improve links between sections and coordinate their work. The Presidium encouraged the merger of the Ukrainian sections into a Geographical Society of the Ukrainian SSR; it approved expansion of the jurisdiction of the Moscow branch over 12 additional oblasts; it supported the merger in 1957 of the Orenburg, Perm', Udmurt, Urals and the Chelyabinsk sections into a Urals branch; it planned in 1958 and carried out in 1959 the establishment in Irkutsk of a Siberian bureau of the Geographical Society (actually a Bureau of the Branches and Sections of the Geographical Society in Siberia and the Far East), which will coordinate the activities of all 19 Siberian and Far Eastern local organizations and assist the Siberian Division of the Academy of Sciences USSR in the study of the natural resources of the area from the Urals to the Pacific.

The list of the Society's branches and sections appears in Table 1.

Table 1

Structure of the Geographical Society's Branches and Sections
Having Territorial Subdivisions as of January 1, 1960

Branches and Headquarters	Sections within Branches
Azerbaydzhan (Baku)	Kirovabad, Massaly, Nakhichevan, Pushkino and 12 additional rayon sections.
Armenia (Yerevan)	Kirovakan, Leninakan.
Belorussia (Minsk)	Mogilev.
Georgia (Tbilisi)	Batumi, Gori, Kutaisi, Sukhumi.
Kazakhstan (Alma-Ata)	Akmolinsk, North Kazakhstan, Semipalatinsk, Ust'-Kamenogorsk.
Kirghizia (Frunze)	Issyk-Kul' (Przheval'sk), Pokrovka.
Komi (Syktyvkar)	Vorkuta, Ukhta.
Lithuania (Vilnius)	Kaunas.
Moscow	Bryansk, Voronezh, Gor'kiy, Kalinin, Lipetsk, Tambov, Yaroslavl'.
Amur (Khabarovsk)	Kamchatka (Petropavlovsk), Komsomol'sk.
Turkmenia (Ashkhabad)	Chardzhou.
Uzbekistan (Tashkent)	Samarkand, Fergana.
Ukraine (Kiev)	Crimea (Simferopol'), Lugansk, L'vov, Melitopol', Odessa, Khar'kov, Chernovtsy.
Urals (Sverdlovsk)	Orenburg, Perm', Udmurt (Izhevsk), Chelyabinsk.
Estonia (Tallinn)	Tartu.

Table 1 (continued)

Sections and headquarters	Subsections
Altay (Biysk)	Gorno-Altaysk.
East Siberia (Irkutsk)	Kirensk.
Krasnodar	Krymsk, Sochi, Tuapse.
North Caucasus (Rostov)	North Ossetia.
Sakhalin (Yuzhno-Sakhalinsk)	Aniva, Dolinsk, Korsakov, Makarov, Nevel'sk, Okha, Poronaysk, Uglegorsk, Kholmsk, Chekhov.

Relations with the Branches and Sections

The Second Congress stressed the need for improving relations between the central organization of the Society and its branches and sections. A great deal has been done in that connection, but still not enough. The usual form of relations -- by correspondence -- still predominates, although personal contacts have increased. Among the reports read at Presidium sessions in Leningrad were those from the Moscow, Uzbek, Maritime, Turkmen, Armenian and Urals branches and from the Vologda, East Siberian, Murmansk, Novosibirsk and North Caucasus sections.

There has been sharp improvement in the system of inspections of branches and sections by representatives of the central organization. In 1956-57 about 40 branches and sections were inspected; in 1958-59 somewhat fewer. Among the branches visited were the Maritime, Amur, Latvian, Kazakh, Bashkir, Tadzhik, Uzbek, Georgian, Kirghiz, Tatar and Yakut, and among the sections were those of L'vov, Chernovtsy, Odessa, Orenburg, Perm', Chelyabinsk, Urals, Udmurt, Yaroslavl', Omsk, Crimea, Northern, Kuybyshev, Sakhalin, Saratov, Stalingrad and Tuapse. Some local units were visited twice. Such visits always led to positive results; work became more active; passive leadership was replaced by active direction; the attention of local governmental and party organizations was called to the Society's branches; new sections were formed out of existing cells and so forth. The inspections, however, were not systematic because they were not conducted by staff inspectors (the Society has none) but by members working on a voluntary basis. The Society's Presidium acknowledges with gratitude the help given by the following members: I. P. Gerasimov, F. Ye. Goryachiy, A. T. Zhingarev-Dobrosel'skiy, A. G. Isachenko, I. V. Korostel, M. I. Lopatin, A. I. Matveyev, B. A. Morzhov, Ye. Ye. Shvede, G. E. Shul'ts and others. Special mention is made of P. N. Stepanov, who visited 15 branches and sections.

The branches and sections appreciate the moral support and direction given by the Presidium, but many also need material aid. In this regard the central organization has unfortunately very limited possibilities. Only the Moscow branch gets regular financial help. Four times in the last five years the Presidium was able to make small funds available to the Crimean and Urals sections to help them cover an acute deficit (payment of wages, publications of books and other expenses) amounting to a total of 30,000 rubles. In the last three years the central organization was also able to supply branches and sections with paper for their publications. These paper supplies amounted to 20 tons in 1957, 63 tons in 1958 and 75 tons in 1959.

The central organization also supplied old and new sections with books published by the Geographical Society in the past. These books are designed to form a nucleus of the library of a branch or section. Altogether the Society shipped 55,000 books worth 342,000 rubles to 47 branches and sections.

The central organization also rendered assistance in other fields. With the help of the Society, for example, the Omsk section was able to obtain an automobile that will help expand possible field trips.

Many requests submitted by branches and sections could not be filled, usually because of factors beyond the control of the Presidium.

The Presidium has serious complaints against several branches and sections for failure to observe elementary requirements of social discipline.

The Presidium has mailed to all local bodies a list of the minimal information to be incorporated into annual reports. Without restricting a free form of reporting, that list insured comparability of statistical data for all local bodies. However, in many cases that list was ignored, no statistical data were given, and the reports consisted of such general phrases as to lose all meaning.

Very fine reports are being submitted by the Moscow and Komi branches, and by the Omsk, East Siberian, Perm' and some other sections. The reports of the Moscow branch contain both complete factual data and an analysis of the work done, its Siberian and Omsk sections account for the personal activities of almost every member. At the same time there are very poor reports. The Orenburg section supplied a single page in 1957. The Azerbaydzhan branch gave neither the number of members nor the location of 12 new rayon sections in its 1958 report. The report of the Armenian branch for 1953-57 covered only four pages. Many other such examples could be cited.

Some branches and sections sometimes fail to send annual reports to the central organization. No reports were received in 1957 from the Karelian, Latvian, Mari, Amur, Uzbek, Urals, Ukrainian, and Yakut branches, and from the Kirov, Kyakhta, Pyatigorsk, Northern and Chelyabinsk sections.

No reports were received in 1958 from the Dagestan, Karelian, Latvian, Mari, Maritime and Ukrainian branches and from the Baykal, Kirov, Kyakhta, Orenburg, Northern and Chelyabinsk sections.

Finally, even on the eve of the Congress, as the present summary report went to press (January 15, 1960), no reports had been received for 1959 from the Kyakhta, Novozybkov, Taymyr, Chelyabinsk, Tuva and Kaliningrad sections.

The Society's Presidium must assume a large share of the responsibility for this situation because it has relaxed its requirements with regard to the branches and sections. But the principal responsibility must, of course, be assigned to the local bodies themselves, which refuse to meet the few obligations toward the governing bodies of the Society that they have elected.

The preceding remarks are designed to explain and justify any statistical defects and gaps in the present summary report.

Membership of the Society

Members of the Society who have died in recent years included: V. A. Obruchev, honorary president; Ye. V. Bliznyak, N. L. Korzhenevskiy, G. M. Krzhizhanovskiy, honorary members; and M. K. Azadovskiy, A. I. Andreyev, I. V. Arembovskiy, V. V. Batyr, V. N. Bernadskiy, G. N. Gekhtman, P. I. Gordeyev, D. P. Gedevanishvili, N. N. Dzens-Litovskaya, N. I. Dmitriyev, D. K. Zelenin, N. N. Ivanov, V. P. Kamenev, N. N. Kolosovskiy, V. A. Kondakov, V. L. Leont'yev, A. F. Levitskiy, B. K. Manteyfel', A. V. Marakuyev, Ye. A. Malyugin, A. N. Orlova, V. A. Petrov, I. I. Popov, L. B. Rukhin, A. A. Savitskiy, N. M. Sinitsyn, P. P. Slavnin, I. K. Tikhomirov, N. A. Troitskiy, N. S. Fedorov, V. Yu. Fridolin, G. N. Cherdantsev, V. M. Chetyrkin, G. G. Shenberg, V. N. Shnitnikov, I. A. Shukhov and others. The Society will always cherish their memory.

The membership of the Society increased as follows in recent years: from 3,560 in 1947 to 6,000 in 1954 and 9,960 in 1959. A more detailed account of membership growth is given in Table 2, It gives data for all branches and sections directly subordinated to the Society's central organization, as well as for sections within branches that have submitted annual reports more or less regularly. Membership figures in parentheses are interpolated; x signifies lack of data.

The Leningrad, Moscow, Ukrainian and Georgian organizations were the Society's largest, including more than 50 per cent of all members.

The greater the organization, the more work it has been doing. However, the key factor is not the total membership but the number of active members. An uneven rate of activity usually reflects the addition or the departure of active members. Since 1956 nothing has been heard from the Chelyabinsk and Kalinin sections and the Karelian branch; after several years' inactivity the Yakut branch has displayed signs of life only since 1958. The North Caucasian section was so feeble for a time that its inactivity prompted the appearance of an article title "An Inactive Society" in the Rostov newspaper Molot of March 27, 1958.

Table 2

Membership of the Geographical Society in 1959

No.	Branch or Section	Founding Date	Headquarters	Membership in 1959
0	Central Organization	1845	Leningrad	1240
	Branches			
1	Geographical Society Azerbaydzhan SSR	1939	Baku	332
2	Armenian Geographical Society	1935	Yerevan	190
3	Bashkir branch	1955	Ufa	82
4	Geographical Society Belorussian SSR	1954	Minsk	95
5	Buryat branch	1955	Ulan-Ude	125
6	Geographical Society Georgian SSR	1924	Tbilisi	1027
7	Dagestan branch	1958	Makhach-Kala	47
8	Geographical Society Kazakh SSR	1952	Alma-Ata	126
9	Karelian branch	1945	Petrozavodsk	(40)
10	Geographical Society Kirghiz SSR	1947	Frunze	60
11	Komi branch	1948	Syktyvkar	126
12	Mari branch	1948	Yoshkar-Ola	x
13	Geographical Society Latvian SSR	1952	Riga	60
14	Geographical Society Lithuanian SSR	1955	Vilnius	140
15	Moscow branch	1946	Moscow	1519
16	Amur branch(Priamurskiy)	1894	Khabarovsk	98
17	Maritime branch	1884	Vladivostok	283
18	Tadzhik Geographical Society	1953	Stalinabad	64
19	Tatar branch	1947	Kazan'	84
20	Turkmen Geographical Society	1945	Ashkhabad	62
21	Geographical Society Uzbek SSR	1896	Tashkent	135
22	Ukrainian Geographical Society	1947	Kiev	305
23	Urals branch	1946	Sverdlovsk	79
24	Estonian Geographical Society	1955	Tallinn	155
25	Yakut branch	1913	Yakutsk	90

Table 2 (continued)

Sections				
1	Altay	1955	Biysk	55
2	Amur (Amurskiy)	1954	Blagoveshchensk	17
3	Baykal	1956	Listvenichnoye	54
4	Bryansk	1958	Bryansk	28
5	Vologda	1954	Vologda	57
6	Voronezh	1948	Voronezh	64
7	East Siberia	1851	Irkutsk	115
8	Gor'kiy	1947	Gor'kiy	58
9	Transbaykalia	1894	Chita	37
10	West Kazakhstan	1946	Ural'sk	34
11	Kaliningrad	1959	Kaliningrad	11
12	Kalinin	1946	Kalinin	52
13	Kirov	1955	Kirov	34
14	Krasnodar	1957	Krasnodar	132
15	Krasnoyarsk	1901	Krasnoyarsk	52
16	Crimea	1945	Simferopol'	146
17	Kuybyshev	1948	Kuybyshev	67
18	Kyakhta	1894	Kyakhta	18
19	Lipetsk	1958	Lipetsk	20
20	L'vov	1947	L'vov	152
21	Magadan	1955	Magadan	97
22	Melitopol'	1957	Melitopol'	67
23	Mogilev	1958	Mogilev	21
24	Murmansk	1947	Kirovsk	52
25	Nozozybkov	1955	Novozybkov	28
26	Novosibirsk	1946	Novosibirsk	90
27	Odessa	1954	Odessa	123
28	Omsk	1877	Omsk	113
29	Orenburg	1868	Orenburg	32
30	Perm'	1954	Perm'	65
31	Pyatigorsk	1954	Pyatigorsk	40
32	Saratov	1940	Saratov	48
33	Sakhalin	1952	Yuzhno-Sakhalinsk	325
34	North Caucasus	1947	Rostov-on-Don	115
35	Northern	1944	Arkhangel'sk	45
36	Stavropol'	1958	Stavropol'	26
37	Stalingrad	1950	Stalingrad	23
38	Taymyr	1958	Noril'sk	32
39	Tambov	1951	Tambov	30
40	Tomsk	1948	Tomsk	48
41	Tuva	1958	Kyzyl	25
42	Tyumen'	1958	Tyumen'	62
43	Udmurt	1956	Izhevsk	33
44	Fergana	1954	Fergana	25
45	Khar'kov	1947	Khar'kov	256
46	Chelyabinsk	1944	Chelyabinsk	56
47	Chernovtsy	1946	Chernovtsy	288
48	Yaroslavl'	1951	Yaroslavl'	26
			Total	9958

The work of branches and sections is also affected by the attitude of their natural sponsors, namely academic institutions. The academies of sciences of Georgia, Armenia and Kazakhstan and the Kola and Komi branches, and the Siberian Division of the Academy of Sciences of the USSR have been greatly assisting local organizations of the Geographical Society. On the other hand, no interest has been displayed by the presidiums of the academies of sciences of the Kirghiz SSSR, the Uzbek SSR and the Belorussian SSR.

In addition to regular and honorary members, the Geographical Society also includes so-called student members and institutional members. The student-member category, established by the Second Congress, is not very popular, the total number being less than 300. Since students usually move elsewhere after graduation, the student-member category of a given branch or section has a great turnover. Some branches have therefore refused to admit student members. This attitude is hardly correct since such branches are more concerned with their "peace of mind" than with the benefit that even a short-lived association with the Society can bring to a student. Some sections adopt another extreme: they admit students en masse as regular members in violation of the Charter (the Sakhalin section, for example, has 115 students out of 325 members). Institutional members also make up an "unstable" category. In 1955, for example, the Amur branch had the following institutional members: the Khabarovsk Regional Museum, the Regional Science Library and the Khabarovsk Pedagogic Institute, of which only the Museum was left in 1956.

The functions and roles of institutional members are not quite clear, and it would be good if the branches and sections told us of their experience in this matter.

The Charter of the Geographical Society

Although the Charter was adopted February 10, 1955, at the Second Congress, it was not published till four years later. It was twice approved by the Presidium of the Academy of Sciences USSR: July 6, 1956 and November 28, 1958.

The reason for all this was that the Charter sent to the Academy for approval in 1956 had been tampered with by the then deputy secretary of the Academy's Department of Geologic and Geographic Sciences, G. V. Bogomolov. He substituted the text of a standard charter of scientific societies of the Academy of Sciences for almost the entire text of the geographical Society's individual Charter, and the substitute was then approved by the Academy's Presidium.

The Council of the Geographical Society naturally refused to accept the substitute Charter, made a protest and spent a great deal of effort before the Academy's Presidium agreed finally to review the charter question at the end of 1958. During this "second reading" the Society was able to restore the text formulation adopted by the Second Congress, except for some minor editorial changes.

Scientific Papers, Meetings and Conferences

One of the Geographical Society's main forms of activity, which the Second Congress urged to be expanded further, is the discussion of scientific papers presented at general assemblies, sessions of divisions, commissions and sections, and at specially convened meetings and conferences.

More than 60 such meetings and conferences were convened in the last five years. They are listed in Table 3. All meetings were fruitful and their scientific content was high.

The number of papers discussed at sessions of the Society was 1,100 in 1955, 1,201 in 1956, 1,410 in 1957, 1,473 in 1958 and 1,558 in 1959, a total of 6,700 for the entire five-year period, and an average of 1,350 a year. That figure, although huge, is probably too small because some papers have not been reported because of statistical gaps. The upsurge of activity is evident from the fact that in the preceding eight-year period 1947-54, the total number of papers was 5,650 or an average of 706 a year.

It is of course impossible for this report to list the topics of the papers presented. Suffice it to say that the principal topics touched on the decisions of the 20th and 21st party congresses, the International Geophysical Year, natural resources and their rational utilization, questions of geographic theory and methodology, landscape studies, physical-geographic and economic regionalization, economic development of Siberia, conservation and transformation of nature, integrated geographic study methods, geography's contribution to the national economy, the study of the Arctic and Antarctic, geographic education in relation to the reform of secondary and higher education, discussion of manuscripts and published studies of the Geographical Publishing House, the Geography Abstracts Journal, the Large Soviet Encyclopedia, as well as textbooks and teaching aids; problems in local area studies, tourism and the dissemination of geographic knowledge, compilation of local geographic gazetteers, integrated atlases of oblasts and republics, the participation of geographers in land-use evaluation, standardization of geographic terminology and so forth. At the same time each branch and section also discussed local geographic problems.

The organization of these meetings and conferences and the presentation of many important papers have undoubtedly strengthened the scientific authority of the Society both at the center and in the provinces.

Field Studies

In accordance with resolutions of the Second Congress, the Society continued to encourage field activities of many branches and sections.

Table 3

Meetings and Conferences 1955-59

Year	Place	Name of Conference	Organized by
1955	Moscow	Second Congress of Society	Central Organization (hereafter Center)
	Leningrad	Geographic Names Transcription	"
	"	First Landscape Studies	"
	"	First Astrogeology	"
	Riga	Latvian Soil Mapping	Latvian branch
	Moscow	Map Editing	Moscow branch
	Vologda	Vologda Oblast Development	Vologda section, Oblast Planning Authority, Pedagogic Institute
1956	L'vov	Second Landscape Studies	Center and L'vov sectio
	Leningrad	Second Astrogeology	Center
	Yerevan	Geography of Armenia	Armenian branch
	Moscow	Land-use Evaluation	Moscow branch
	"	Mapping Techniques	"
	"	Origin of Peneplain and Pediment	"
	"	Pleistocene Glaciation of North Siberia	"
	Tbilisi	Transcaucasian Geography	Georgian branch
	Leningrad	Shokal'skiy Memorial	Center
1957	Baku	Azerbaydzhan Economic Regions	Azerbaydzhan branch
	Ulan-Ude	Baykal Studies	Buryat branch
	everywhere	40th Anniversary of Revolution	All local units
	Vladivostok	Conservation	Maritime branch
	Kiev	Ukrainian Agricultural Regions	Ukrainian branch and Kiev University
	Tallinn	Geographic Problems	Estonian branch
	"	Home-area Study Problems	"
	Sverdlovsk	Third Urals Meeting	Urals branch
	Leningrad	National Phenology Meeting	Center
1958	Tbilisi	Third Landscape Studies	Center and Georgian branch
	Moscow	Nature Preserves	Moscow branch and Moscow Society of Students of Nature

Table 3 (continued)

1958	Moscow	Regional Karst Studies	Moscow branch
	"	National Atlas Commission of International Geographical Union	National Committee of Soviet Geographers, Moscow branch, Center
	Perm'	Fourth Urals Meeting on Physical and Economic Regions	Perm' section and Perm' University
	Krasnodar	Transformation of Nature in Krasnodar Kray	Krasnodar section
	Simferopol'	Crimea Water Resources	Crimean section
	Leningrad	Hydrogeology of Leningrad Economic Region	Center, Leningrad Regional Economic Council
	Vladivostok	First Biogeography of Far East	Maritime branch
1959	Riga	Fourth Landscape Studies	Center, Latvian branch
	Irkutsk	First Siberian and Far Eastern Geographers' Meeting	Center, East Siberia branch, Siberian division of Academy of Sciences
	Biysk	Altay Kray Natural Resources	Altay Section and Altay Economic Council
	everywhere	Humboldt Centennial	Center and all units
	Perm'	Fifth Urals Meeting	Urals branch Perm' section Perm' University
	Moscow	Satellite Cities	Moscow branch
	"	Quantitative Geomorphic Methods	"
	"	Mountain Glaciation	"
	Khar'kov	Natural Resources of Left-Bank Ukraine	Khar'kov section Khar'kov University economic councils
	Vladivostok	Speleology	Maritime branch
	"	Second biogeography of Far East	"

The Armenian branch organized five field trips in 1955, including a geomorphic study of the environs of Yerevan and a physical-geographic study of the northern and high-mountain areas of Armenia.

The Buryat branch has been studying the biogeography of the Vitim Plateau since 1956 to determine the prospects of fur and poultry farming in the area. Under a contract with the Regional Museum of Ulan-Ude, the branch described the cultural memorialsof the Buryat ASSR in 1958 and 1959.

The Vologda section studied the landscapes of the Sheksna valley in 1955.

The Voronezh section studied terrain types in the Kalach hills and the Oka-Don lowland in 1955, and then organized an integrated study of microregions of the Berezovskiy Rayon, landscape studies of the Central Chernozem oblasts and integrated studies of the collective farm economies of Voronezh Oblast (1956). In 1957-59 the section carried on landscape-type and economic-geographic work in the Central Chernozem region and, on assignment from the Administration of Small-River Navigation, made an integrated study of the Matyra River (a tributary of the Voronezh) for shipping purposes.

The East Siberian section sent out a winter field party in 1955 to study the wintering conditions of water fowl on Lake Baykal. It also sent a ethnographic-folklore party to Ol'khon Island and the Barguzin area.

The Gor'kiy section undertook integrated geographic field studies of Pavlovo and Lyskovo Rayons (1955), followed by other areas.

The Geographical Society of the Georgian SSR studied the electric-power potential of tributaries of the Alazan' River(1955), investigated mud flows in 1956-57, and sent an ethnographic field party into Tushetiya.

The West Kazakhstan section made geobotanical surveys in the Ural River delta and conducted toponymic and folklore studies (1955).

The Kazakh branch undertook several field trips. They included, in 1955, the Kokchetav lake-study trip, economic-geographic studies of northern and central Kazakhstan and combination mountaineering and study trips to Pobeda Peak and the upper reaches of the Kaskelen River in the Trans-Ili Alatau. Mountain climbers visited the source area of the Chemolgan River (Trans-Ili Alatau) in 1956. Among the eleven field parties of 1959 were the Kustanay lake-study party, the Central Kazakhstan physical-geographic party, and the Malaya Almatinka glaciological party.

The Kirov section studied the regional geography of Kirov Oblast in 1955.

The Komi branch carried out studies in the Ukhta River basin in 1956, and investigated beaver acclimatization and other problems in 1959.

The Kuybyshev section has been conducting dialect-study trips over a number of years.

The L'vov section has been very active in the field. In 1955 it started the integrated study of 14 rayons in the Carpathian foothills.

Together with the Geography Faculty of L'vov University, it conducted integrated field studies in the Carpathians, Volhynia and Podolia in 1957 and 1958. Since 1957 a field party has been engaged in a government-contract soil survey in collective farms of the Western Ukraine. A total of 749,000 hectares have been surveyed. The contract payments amounted to 584,000 rubles in 1958 and 801,000 rubles in 1959.

The Omsk section has also been actively doing field work under contract since 1952. Six studies were under way in 1955, including a survey of pasture and hay-meadow resources in the state farms of the Administration of the Meat Industry. This survey continued through 1959. Field work was greatly facilitated by the automobile that had been acquired through the assistance of the Society's Presidium. Other field studies included ethnographic work, registration of architectural memorials, the study of vegetation in Omsk Oblast, a reconnaissance survey of the lakes of northeastern Kazakhstan, and geomorphic studies. Field trips totaled ten in 1957 and thirty in 1958.

The Orenburg section studied the virgin lands of the oblast in 1956 and 1957.

Interesting field studies were organized by the Novosibirsk section. In 1955 field work consisted only of a trip along the Ob' and Irtysh and a visit to the pine forest of the Kuznetskiy Alatau. But from 1956 through 1958, the section organized a large field party, under an agreement with the local branch of the Academy of Sciences, to study the area of the future reservoir of the Novosibirsk hydroelectric station and adjoining territory. In 1959 the Siberian Division of the Academy of Sciences supplied funds for a field study of the salt lakes of the Altay and the glaciers of the Katun' River.

Field studies of the Perm' section in 1955-57 concentrated on physical-geographic work in the drainage basin of the Kama Reservoir, the hydrology of the Vishera basin and the karst of the western Urals. The integrated Komi-Permyak party was in the field in 1956-57. Field-study topics in 1958 and 1959 included the physical geography of Perm' Oblast, the first Kama Reservoir and karst and underground waters in karst areas.

The lumber trust Khabarovskles financed field parties of the Amur branch to study the midge and mosquito plague in 1955-56. Other field parties engaged in mountaineering in Kamchatka, karst studies in the Amur region and in investigation of the Amur cork tree. The field activities of 1956 included an integrated field party to study the Kur-Urmiyskiy Rayon and studies of fur-bearing animals in Khabarovsk Kray and of possible acclimatization of the beaver and the sable. In 1958 the Khekhtsir field party studied acclimatization of the sable on assignment from the State Hunting Inspector's Office of the Khabarovsk Kray government. Other field parties in 1958 included the Upper Amur zoogeographic and economic-geographic studies, the Sikhote-Alin field study and mountaineering in Kamchatka. In 1959 the Upper Bureya field party began a two-year study project; the productive forces of the Komsomol'sk rural area were investigated; the Ussuri archeological field party worked under contract jointly with the Leningrad division of the Institute of Material Culture, and the regime of the Tumnin River was investigated.

The Maritime branch joined the Military Historical Museum in 1956 in a field study of Bering Island. Another field group in that year investigated remains of prehistoric settlements in the area of Ol'ga Bay. The following year the Maritime branch, together with the Far Eastern branch of the Academy of Sciences, took part in the Amgun zoogeographic and Amur ethnographic field parties. The ethnography of the Udege and Nanay peoples was also investigated in 1958-59. In 1959 a field party was sent to the Geyzernaya River valley of Kamchatka and speleological studies were made in the Maykhe valley, at Golubinaya Mountain and in the Tetyukhe area.

The Tatar branch sent an ethnographic study group to Tuva Autonomous Oblast in 1955.

The Urals section engaged in botanical surveys in the Polar Urals in 1955-56 and studied the Kama Reservoir, some lakes of the Urals and the distribution of bird life on the boundary between the wooded steppe and the forest zone of the Middle Trans-Urals area.

Field parties of the Chelyabinsk section in 1955-56 studied the karst in the upper reaches of the Chusovaya River and carried out integrated studies of the Min'yar Rayon, physical-geographic studies of the Ubagan River basin (Kustanay Oblast) and economic-geographic studies of the southern rayons of Chelyabinsk Oblast.

The Chernovtsy section joined the University in several integrated study trips to the Carpathian Mountains and the Carpathian Foreland and, under contract, studied the soils of the collective farms of Chernovtsy and Odessa oblasts and the productive forces of the Stanislav Economic Region.

The total number of field trips (as usual, the statistics are not complete) was as follows: 42 in 1955, 32 in 1956, 24 in 1957, 48 in 1958, at least 36 in 1959, or a total of more than 182 for the five-year period.

Excursions

Although excursions of branches and sections received little attention in past summary reports, they occupy a place midway between actual field studies and lecture tours.

Special mention should be made of excursions organized for participants of national landscape-study conferences, such as the excursions to the Carpathians (L'vov section, 1956); the Tsalka lava plateau, the Trialet Mountains, Kartalinia, Kavkasioni, the Surami Mountains, the Colchis lowland, and the mountainous and coastal areas of Abkhazia (Georgian branch, 1958), and the excursions through Latvia (Latvian branch, 1959).

Other excursions are listed below:

Bashkir branch: Belaya River (for its members, 1955).

Georgian branch: through Tbilisi and along the Georgian Military Highway for 37 Polish geographers making a tour of the USSR under the guidance of Prof. J. Kondracki of Warsaw (1959); a trip for teachers with the itinerary Tbilisi-Kiev-Kakhovka-Crimea-Tbilisi (1957).

Transbaykal section: a regional study excursion with students to the Chikoy River (1955).

Kazakh branch: camping trips -- following the itineraries of P. P. Semenov-Tyan-Shanskiy (1955, 1956), to the Pamirs and the Semirech'ye area (1957), to the Ili valley (1958).

Murmansk section: annual excursions with visiting students to the Khibiny tundra.

Novosibirsk section: a study excursion to the place of exile of Ya. M. Sverdlov and the upper reaches of the Ket' River (on a river boat with a movie camera), which made it possible to determine the present condition of the Ob'-Yenisey Canal (1957).

Omsk section: a regional-study camping trip to the area of the Urna River (a tributary of the Dem'yan).

Maritime branch: in 1955, a 30-day sports excursion over the 850-km itinerary Komsomol'sk-Volochayevsk-Khabarovsk-Komsomol'sk; 4-day camping trips for secondary-school students over four itineraries; longer camping trips for students (38 to 43 days) to the Sikhote-Alin' Mountains over five itineraries; in 1956, a student excursion to the northeastern part of the Sikhote-Alin' and a mountaineering expedition to Kamchatka, involving ascent of the Ichinskiy Volcano; in 1957, a camping trip to the Sikhote-Alin'.

Udmurt section: an excursion for geography teachers of the city of Izhevsk through parts of the Udmurt ASSR (1957).

Ukrainian branch: excursion for Kiev students to the Carpathians (1955).

Sakhalin section: an excursion for student members to the Kuril Islands (1958).

Khar'kov section: excursions through the Ukraine and the Caucasus.

Yaroslavl' section: regional-study excursions along the Volga valley and through the southern and southwestern rayons of the oblast (1955).

Such excursions have considerable educational and political importance. They represent a form of mass activity deriving from the nature of geography and the aims of the Society that should be encouraged and expanded.

Dissemination of Geographic Knowledge

The dissemination of geographic knowledge in all its forms constitutes one of the main activities of the Geographical Society. Many local organizations have permanent geographic lecture halls, as in the case of Leningrad, Vologda, Novosibirsk, Rostov on Don, Yuzhno-Sakhalinsk, Ufa, Kuybyshev and Khabarovsk. The number of lectures given under auspices of the Society was: 2,487 in 1955, 2,541 in 1956, 2,237 in 1957, 2,575 in 1958, and 5,402 in 1959, a total of 15,200 lectures for the five-year period compared with 11,400 for the eight-year period 1947-54. Audiences totaled 756,000 persons.

In addition to the special lecture halls, these lectures were given in teacher refresher courses, houses of culture, clubs, libraries, factories, schools, children's camps, children's palaces, military units and research institutions. As an example of lecture topics, we will cite the lectures given in 1958 by the Shokal'skiy Lecture Hall in Leningrad. Out of a total of 272 lectures (of which 212 were given in outside institutions), 13 dealt with party and government decisions, 28 with the Soviet Union, 24 with the people's democracies, 28 with the Arctic and Antarctic, 46 with personal impressions of foreign countries, 38 with capitalist and colonial countries, 11 with famous Russian explorers, 18 with the International Geophysical Year and artificial earth satellites, 33 with the series "Cities of the World" and 32 with other topics.

Dissemination of geographic knowledge also included radio talks, the publication of popular pamphlets, newspaper posters and picture postcards with geographic content, the organization of camping trips and rallies, the publication of articles in local newspapers, and sponsorship of young geographers' societies. Although these activities have been very extensive, they cannot be summarized statistically. Hundreds of newspaper articles have been published. The Buryat branch issued more than 100,000 picture postcards with views of Lake Baykal and Ulan-Ude (in 1959, the branch also started issuing cards with pictures of opera and ballet stars; this activity having nothing to do with geography should be stopped). The Amur branch published 100,000 postcards with views of Khabarovsk. Members of the regional-study commission of the Khar'kov branch set up 30 small regional-study exhibits in rayons of the oblast, mainly in schools. The Yakutsk branch also set up regional-study exhibits in 20 schools (1959). Young geographers' societies are sponsored by the Murmansk section, the Tatar and Amur branches, the Northern section and others. The Northern section and the Amur branch even absorbed these youth units in their organizations. The Young Geographer Society in the Amur branch includes 558 pupils and made three geology field trips in 1959.

The excursions discussed in the preceding section are also an important part of the dissemination of geographic knowledge.

It can be said that the resolution of the Second Congress regarding expansion of the dissemination of geographic knowledge has been carried out satisfactorily. However ,one major point of that resolution, regarding the establishment of a mass-circulation geographic magazine Zemlya i lyudi (The Earth and Its People), could not be carried out. The commission charged by the Second Congress with that question was in close contact with the Society's Moscow branch and with the Geographical Publishing House. These organizations completed the necessary planning, including a program and statement of purpose of the new magazine, a proposed layout, a list of authors and cost estimates: they proposed an editor (S. V. Obruchev) and received approval for publication. They still have to find a printer and insure a supply of high-grade paper. Let us hope that these problems will be solved this year. They probably could have been solved earlier if the Society's Presidium had given them greater attention.

The Phenological Network

The Society's phenological network, made up by volunteer corresponding phenologists, expanded rapidly in the last two years, as shown in the following table:

	1955	1956	1957	1958	1959
Correspondents of the Central Organization	262	304	242	273	281
Correspondents for special observations					120
Correspondents of local networks (approximate data)	100	120	150	250	600
	362	424	392	523	1001

The number of correspondents of the central organization has become stablilized. But the local networks of branches and sections have greatly expanded as a result of organization and explanation by the Central Phenological Commission. In 1958 there were phenological commissions in 18 branches and sections. In 1959 observation data were received by the Moscow branch from 100 observation points, by the Urals branch from 150 points, by the Kirov section from 59, and by the Latvian branch from 116 correspondents. The Central Organization of the Society has set up a phenological sector to analyze the phenological observation data accumulated in the Society's archives over the years. In the last five years the phenological section has compiled about 80 nature calendars and reference tables for individual years.

This expanding study of the seasonal rhythms of geographic landscapes is of crucial importance both for theory and for practical purposes. To meet high-priority inquiries from various organizations, the Society has now organized special phenological observations of agricultural pests and the ripening of wild fruit.

The Society publishes an information bulletin for its phenological correspondents. Ten issues had appeared by the end of 1959.

Awards of Medals and Prizes

The following medals and prizes were awarded in the last five years: The Great Gold Medal of the Geographical Society to the famous explorer of Severnaya Zemlya, N. N. Urvantsev; The Litke Medal to L. A. Zenkevich, corresponding member of the Academy of Sciences USSR, for his work in oceanography and marine biology, and to Prof. V.P. Zenkovich for his work on seashore geomorphology; the Semenov Medal to Prof. P. V. Ushakov for marine zoogeographic studies; the Przheval'skiy Medal to Prof. A. P. Yushchenko for work in cartography and geodesy and to Prof. I. D. Zhongolovich for work on the shape of the earth. The Dezhnev Prize was awarded t M. I. Belov for his history of Arctic exploration. One Semenov Medal was not awarded.

Branches and sections are rather passive with regard to proposing work of their members for the Society's awards. The Presidium wishes to take the opportunity of this Congress to urge everyone not to neglect the existing possibilities of giving awards for the best geographic work.

Publications

The Second Congress urged branches and sections to publish their own periodicals and serials. As shown in Table 4, 30 branches and sections issued publications during the 1955-59 period, with 18 local units doing so for the first time.

In additions to serials, branches and sections published pamphlets, travel guides and monographs. For example, the Armenian branch published in 1957 the Proceedings of the IV Geomorphic Conference on the Caucasus and Transcaucasia and I. S. Stepanyan's book on Armenian maps of the last 260 years. The Buryat branch published several pamphlets, including one by B. V. Semichov on Tsibiokov, the explorer of Tibet (1957). The East Siberian section also published several pamphlets, including one on economic development of the Siberian North and another on the Siberian stone pine. The Georgian Geographical Society published V. I. Kavrishvili's monograph on Georgia's landscape and hydrologic zones (1955) and Sh. Kipiani's monograph on geography and geographic education in Georgia (Part I, 1957). The L'vov section published the proceedings of the Second Landscape-Studies Conference in 1957.

Among other publications worthy of note are a series of books on regional geography: Priroda Amurskoy oblasti (The Natural Environment of Amur Oblast), published by the Amur section in 1959; Priroda i khozyaystvo Yaroslavskoy oblasti (The Natural Environment and the Economy of Yaroslavl' Oblast), published in 1959 by the Yaroslavl' section in conjunction with

Table 4

Serials and Periodicals Published by the Branches and Sections of the Geographical Society of the USSR during 1955-59

No.	Branch or Section	Publication	Number of Issue	Year of Publication
1	Amur section	Amurskiy krayeved (newspaper poster)		1958,1959
2	Bashkir branch	Zapiski	1	1957
3	Belorussian branch	Voprosy geografii Belorussii	1	in press
4	Buryat branch	Krayevedcheskiy sbornik	1	1957
			2	1958
			3,4	1959
5	Vologda section	Vologodskiy kray	1	1959
6	Voronezh section	Izvestiya	1	1957
			2	1959
7	East Siberiean section	Izvestiya	58	1955
			59	in press
8	Georgian branch	Trudy	3	1958
			4,5	1959
9	West Kazakhstan section	Nauchnyye zapiski	7,8	1956
			9	1957
			10-11	1958
10	Kazakh branch	Voprosy geografii Kazakhstana	1	1955
			2,3	1956-58
			4,5	1959
11	Komi branch	Izvestiya	3	1955
			4	1957
			5	1959
12	Kirghiz branch	Izvestiya	1	1959
13	Crimean section	Izvestiya	4	1957
			5	1958
14	Kyakhta section	Kyakhtinskiy krayeved (newspaper poster)		since 1956
15	Lithuanian branch	Geograficheskiy yezhegodnik	1	1958
			2	1959
16	Moscow branch	Voprosy geografii	37	1955
			38,39	1956
			40,41	1957
			42,43,44	1958
			45,46,47	1959
17	Novozybkov section	Izvestiya	1	1958

Table 4 (continued)

No.	Branch or Section	Publication	Number of Issue	Year of Publication
18	Novosibirsk section	Izvestiya	1	1957
			2,3	1958
			4	1959
19	Omsk section	Izvestiya	1(8)	1956
			2(9)	1958
			3(10)	in press
20	Perm' section	Doklady	1	1959
21	Amur branch	Voprosy geografii Dal'nego Vostoka	2	1955
			3	1956
		Amurskiy sbornik	1	1959
22	Tadzhik branch	Sbornik statey	1	1959
23	Tomsk section	Voprosy geografii Sibiri	4	in press
24	Turkmen branch	Trudy	1	1958
			2	in press
25	Uzbek branch	Izvestiya	1	1955
			2	1956
			3	1957
26	Ukrainian branch	Geograficheskiy sbornik	1	1956
			2	1957
27	Urals branch	Uchenyye zapiski	2	1955
			3	in press
28	Chelyabinsk section	Uchenyye zapiski	2	1957
29	Chernovtsy section	Uchenyye zapiski	1	1958
			2	1959
		Izvestiya	1	1958
30	Estonian branch	Yezhegodnik	1957	1957
			1958	1959

the Yaroslavl' Teachers College), Priroda Urala (The Natural Environment of the Urals), published in 1958 by the Urals branch; Po rodnomu krayu (Our Home Area), published in 1955 by the Orenburg section; Kur-Urmiyskiy Rayon, published in 1958 by the Amur branch, and Permskaya oblast', published in 1959 by the Perm' section. These books, written by geographers who reside in the areas described and know them thoroughly from personal observations, are of great scientific value aside from the fact that these books, like the periodicals and serials published by branches and sections, constitute a major service to local governmental and economic-management agencies.

The dissemination of geographic knowledge was furthered by the publication of travel guides, such as the tourist pamphlets published in 1959 by the Estonian branch, the Sakhalin guide issued in 1956 by the Sakhalin section, and the guide to the Malaya Almatinka valley, published in 1955 by the Kazakh branch.

Unfortunately there has been no improvement since the last Congress in the publishing outlets of the Geographical Society. The Geographical Publishing House published only one book on the Antarctic for the Society's central organization (although it should be noted that the Geographical Publishing House also printed eleven issues of Voprosy Geografii for the Society's Moscow Branch), while the Publishing House of the Academy of Sciences is overloaded and accepts only few publications of the Society. The total volume of publications of the central organization was therefore 597 printer's sheets (a standard Soviet unit 60 by 92 cm.) in 1955-59 compared with 812 sheets in 1947-54.

In an effort to improve this situation, the Presidium published two books experimentally with the Society's own funds: Yu. Dmitrevskiy's Nil and Geograficheskiy sbornik XIII, dealing with cartography. The total cost was 30,000 rubles. This money is being recovered so slowly (because of a poorly organized sale of the books) that the Society will hardly be able to publish any more books with its own funds.

Prospects are somewhat better with respect to limited-circulation publications. In March, 1959, the Society acquired a printing and duplicating laboratory, with a mimeograph machine, largely through the efforts of the Society's secretary, Ye. Ye. Voronov. The present report and the preprints prepared for the Congress were produced in that laboratory. It is hoped that the mimeograph method will be used to publish information bulletins of the divisions and commissions, the texts of individual papers and lectures, and small collections of papers.

No progress can be reported with regard to the resolution of the Second Congress calling for an increase in size of the magazine Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva. Despite repeated written applications to the appropriate authorities and despite a personal interview between the president of the Society and the president of the Academy of Sciences, the Society's efforts were unsuccessful. In fact the size of the magazine was recently reduced and it now appears in six thinnish issues of six printer's sheets each. This is essentially what has given rise to legitimate complaints by readers and authors: that few articles are being published, that a large part of the text is printed in small type, that articles must wait a long time before publication and thus become dated. In fact some articles accepted for publication have already been waiting a year or more. The editor cannot be held responsible for that state of affairs; he receives as many as 400 papers and notes in the course of a year and can publish only 120 to 140 because of lack of space.

The editor has received no comments regarding the contents and range of topics treated in the journal. The Presidium has been informed that some branches and sections have discussed the contents of the Izvestiya VGO at special meetings, but no word has been received regarding the results of the discussions.

A list of publications of the Society's central organization during the period 1955-59 appears in Table 5.

Table 5

Name of Publication	No. of Issue	Year of Publication
A. Periodicals		
Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva	Vol. 87, No. 1-6	1955
	Vol. 88, No. 1-6	1956
	Vol. 89, No. 1-6	1957
	Vol. 90, No. 1-6	1958
	Vol. 91, No. 1-6	1959
B. Serials		
Zapiski Geograficheskogo Obshchestva SSSR, New Series	Vol. 16	1957
	Vol. 17	1958
	Vol. 18	1958
	Vol. 19	in press
	Vol. 20	in press
Geograficheskiy Sbornik	V	1955
	VI	1954
	VII	1955
	VIII	1956
	IX	1957
	X	1958
	XI	1957
	XII	1957
	XIII	1959
Informatsionnyy Byulleten' Fenologicheskogo Sektora	No. 1-10	1956-59
C. Separate Publications		
A. D. Zamorskiy, Atmosfernyy led (Atmospheric Ice)		1955
Chteniya pamyati L. S. Berga (L. S. Berg Memorial Book)		1956
Voprosy Geografii (Special volume prepared for XVIII International Geographical Congress)		1956
same in French		1956
Yu. D. Dmitrevskiy, Nil		1958
Strany i Narody Vostoka (Countries and Peoples of the East), No. 1		1959
Antarktika		1958
Trudy Vsesoyuznogo fenologicheskogo soveshchaniya (Proceedings of the National Phenological Meeting)		in press
Sovetskaya Geografiya (Special volume prepared for XIX International Geographical Congress)		in press

Other Forms and Types of Activity of the Society

In addition to convening conferences, discussing scientific papers and organizing field studies, the Geographical Society was also active in other fields. The most common were the following:

(1) Providing assistance in improving geographic education through discussion of study programs (especially in connection with the reform of secondary and higher education), textbooks, teaching and visual aids, school maps and organization of field trips for students.

(2) Reviewing and editing of books, articles, maps, atlases, geographic films and discussing plans for the publication of geographic literature and the contents of geographic journals.

(3) Consultation and expert advice in all problems of geography. For example, the Presidium of the Society approved the new names of major features of the sea-bottom relief of the Arctic Ocean (1959); the Northern section advised on the districting of the Arkhangel'sk; many branches and sections worked out hiking and camping itineraries; the Moscow branch took active part in the drafting of the Conservation Law of the RSFSR; the Buryat branch and the East Siberian and Baykal sections, supported by the Society as a whole, campaigned successfully for the preservation of Lake Baykal and its natural resources; three members of the Orenburg section are taking part in the work of the Technical and Economic Advisory Council of the Orenburg Regional Economic Council; upon a recommendation from the Crimean section, the plowing of the pasture lands of the Crimean Mountains is being halted; upon recommendation of the Stavropol' , Pyatigorsk and other sections, the Government has established a nature preserve at Arkhyz, in one of the most beautiful spots of the Northern Caucasus.

(4) Execution of several important studies on the Society's own initiative or on order from other institutions. The Perm' section drafted a physical-geographic and economic regionalization of Perm' Oblast for agricultural purposes; the Orenburg section compiled upon the request of the Oblast planning authorities a physical-geographic treatment of the rayons of Orenburg Oblast (1956); the Chernovtsy section, under contract with the Stanislav Regional Economic Council (1957), prepared a study on the development of the productive forces of the Stanislav Economic Region; it also compiled a landscape map of the Transcarpathian Oblast and a map of the physical-geographic rayons of the Stanislav Economic Region (1957).

The Perm' section under contract with the Grain Procurement Administration, carried out a topographic survey of 29 areas designated for the construction of grain elevators (1959) .

The Tambov section (1959) compiled a landscape map of Tambov Oblast at 1:2,500,000, which is now in press.

The Armenian branch published four maps: of the climates, soils, vegetati and the physical-geographic regions of Armenia.

The Urals branch, under contract with the Sverdlovsk Oblast authorities, compiled a climatic map of Sverdlovsk Oblast (1958).

A great deal of work in Vladivostok and other parts of the Maritime Kray has been done by the vegetation study unit of the Maritime branch. Members of the study unit have been developing new varieties of fruits and berries (grapes, cherries, gooseberries and plums), supply plants to interested persons and institutions, organize exhibits of fruit and decorative plants that have been attracting thousands of visitors, and assist local farm organizations in many ways.

The central organization and several branches have been taking an active part in the writing of the Short Geographic Encyclopedia. The L'vov section has compiled an atlas of agriculture of Stanislav Oblast (1956). Members of the Belorussian Geographical Society compiled 50 maps for the Atlas of the Belorussian SSR, which appeared in 1958. The Komi branch and the Yaroslavl', Kalinin, Tambov and Kirov sections have been taking part in the compilation of atlases of the Komi ASSR and Yaroslavl', Kalinin, Kirov and Tambov Oblasts (the Tambov atlas went to the printer in 1958).

Valuable work has also been done on the compilation of local geographic gazetteers. The Moscow branch began work in 1959 on a gazetteer of Moscow Oblast. The Amur section has started a similar project for Amur Oblast. The Kuybyshev section, which is also compiling an oblast gazetteer, has sent out questionnaires to the secretaries of rayon soviets, the chairmen of rayon planning agencies, geography teachers and others. The Maritime branch is continuing its compilation of a gazetteer of the Maritime Kray and the Russian coasts of the Sea of Okhotsk and the Sea of Japan.

(5) Memorial events:

Organization of meetings and exhibits commemorating leading geographers. Upon petition by the Maritime branch, the Government has issued a postage stamp and has named a ship in honor of V. K. Arsen'yev. Upon request of the same branch, the ship Lena, which had taken part in the Nordenskjöld expedition and was about to be dismantled, was given to the Yakutsk Regional Museum.

Through efforts of the Kyakhta section a memorial was built in 1955 on the tomb of A. V. Potanina. Upon request of the Tomsk section, the remains of

G. N. Potanin were transferred from the municipal cemetery to the University Cemetery in 1956, and the following year an iron bust was set up on the explorer's grave.

(6) Library and archive services for members of the Society. Several branches and sections have their own libraries (the Maritime branch 50,000 books; the Moscow branch 7,000 and the Armenian branch 13,000). The Society's Library in Leningrad is the largest geographical library in the USSR. Its intensity of use can be judged from the following table:

Year	No. of readers	No. of visits	Books issued	Books received
1955	652	3976	14719	4583
1956	755	3933	10657	5864
1957	801	3226	11379	8006
1958	891	3735	13713	6508
1959	1063	3977	12456	6367

The total Library holdings as of January 1, 1960 amounted to 326,000 items, including 40,000 maps. The Library maintains exchanges with 34 foreign countries.

The archives were enriched in the last five years with the collections of P. P. Semenov-Tyan-Shanskiy, L. S. Berg, V. L. Komarov, Yu. M. Shokal'skiy, P. A. Kropotkin, Tsinger and others. The reading room of the Archive collections was visited by 389 persons for a total of 3,660 visits during which 22,300 archival items were issued. In addition, the Archives organized 43 visits by students, Soviet scientists and foreign visitors.

International Relations

The Second Congress in its resolution gave considerable attention to the development of international relations of the Geographical Society. In fact, the Congress set an excellent example by having had 22 foreign guests present. Subsequently contacts with foreign geographers and foreign geographic institutions increased year by year. We will cite only the main developments here.

At the beginning of 1956 representatives of the Geographical Society of the USSR participated in the International Geographic Seminar at Aligarh (India) and in that summer in the XVIII International Geographical Congress in Brazil. An 11-man Soviet delegation took with it to Brazil an exhibit of recent maps, atlases and books on geography and the special publication Voprosy Geografii (in Russian and French) containing more than 40 papers written by Society members on topics proposed by the Congress. Shortly after the Congress the Geographical Society of the USSR joined the

International Geographical Union, through the National Committee of Soviet Geographers formed in 1957, and also joined the International Council for the Study of Afro-Asian Geography.

Representatives of the Geographical Society are members of the Leningrad chapters of the USSR-Finland, USSR-Sweden, USSR-Norway and USSR Denmark societies.

Soviet geographers participated in a regional conference of the International Geographical Union in Japan in 1957. In August, 1958, a plenary meeting of the Commission on National Atlases of the IGU (chairman: K. A. Salishchev) in Moscow was attended by persons from 16 countries. Participants also visited Leningrad, where they were received at the Geographical Society.

Members of the Geographical Society also participated in the following meetings abroad: at the First Congress of Hungarian Geographers (S. V. Kalesnik); at the Centennial Meeting of the Austrian Geographical Society (O. A. Konstantinov); at the Sixth Congress of the Polish Geographical Society (S. V. Kalesnik); at plenary meetings of the Commission on Periglacial Morphology of the IGU (K. K. Markov) in Poland(1958) and in Morocco (1959); at the conference on economic regionalization in Kazimierz, Poland (P.M. Alampiyev and others, 1959); at the Czechoslovak Conference on Economic Geography(O. A. Konstantinov); at the meeting marking the Month of Rumanian-Soviet Friendship (O. A. Konstantinov, G. D. Rikhter, 1957); at the conference of the International Association of Geography Teachers in Grenoble (A. V. Darinskiy). The following geographers made trips abroad to give lectures, read papers or establish contacts with foreign geographical societies:

I. P. Gerasimov to Britain, France, Poland, Yugoslavia, Bulgaria, China; S. V. Kalesnik to Paris, Poland, Yugoslavia; Yu. G. Saushkin to Poland, Norway, Yugoslavia; G. A. Maksimovich to Czechoslovakia (1958); V. A. Dement'yev to North Korea; M. A. Zubashchenko to North Vietnam; L. Ye. Rodin to the United Arab Republic;V. B. Sochava to Czechoslovakia and China. Other geographers who visited China included M. P. Petrov, E. M. Murzayev, A.K. Leonov, A. G. Isachenko, D. L. Armand, I. V. Samoylov, A. I. Dzens-Litovskiy, Ye. F. Gur'yanova, F. F. Davitaya, Ye. M. Lavrenko, A. A. Yunatov, V. N. Kunin, A. S. Kes', B. A. Fedorovich and V. P. Zenkovich. K. A. Salishchev visited Stockholm in 1956 and 1959 to maintain contacts with the Swedish Anthropological and Geographical Society .

Several Soviet geographers were elected members of IGU commissions, including Ye. N. Pavlovskiy, K. A. Salishchev, F. F. Davitaya, K. K. Markov. Many Soviet geographers were also elected honorary members and corresponding members of the geographical societies of Poland, Serbia, Croatia and Austria.

The Geographical Society of the USSR, its branches and sections in turn had the pleasure to welcome many outstanding representatives of foreign geographic science. The central organization received Prof. Chu K'o-chen (Co-ching Chu) of China, Prof. J. Kondracki, S. Paszyński and S. Pietkiewicz of Poland, two groups of Rumanian geographers (Prof. Morariu, Herbst, Ianovic, Sandru, Sficlea); Czechoslovak geographers (Prof. Korcak, Dr. Strzida); the secretary of the National Committee of Finnish Geographers, Prof. Helmer Smeds; the vice president of the IGU, Prof. Chauncy Harris of Chicago and others. The Moscow branch welcomed the Danish oceanographer Prof. A. Bruun; the Georgian branch received Anwar Haaman, professor at the University of Syria; Prof. Winkler, vice president of the Swiss Geographical Society, and a group of 37 Polish geographers traveling as tourists. The Latvian branch was visited by Prof. J. Kondracki of Poland and J. Gellert of East Germany. The Geographical Society printed in its journal several articles submitted by foreign geographers (L. P. Kirwan, S. Leszczycki, Penchev and others); articles by several Soviet geographers, in turn, were published in foreign geographic journals. The Geographical Society of the USSR has invited 35 foreign geographers to its Third Congress. Unfortunately not all were able to accept.

The Society is now actively preparing for the XIX International Geographical Congress in Stockholm in August, 1960. Two Soviet geographers will act as chairmen of Congress sections. Abstracts of 98 papers submitted by Soviet geographers have already been sent to Sweden. The Society will publish a special volume titled Sovetskaya Geografiya discussing the achievements of geography in the USSR under Soviet rule. Several other publications are also being prepared for the Congress.

Implementation of Decisions of the Second Congress

The Second Congress adopted two types of decisions: some were directives to all organizations of the Geographical Society; others were in the nature of general scientific and organizational recommendations.

The following directives have been implemented: the development of international contacts by the Society, especially with the people's democracies; the expansion of the network of branches and sections and the increase in the active membership; the improvement of management of branches and sections; the expansion of field studies, contacts with industry and agriculture, dissemination of geographic knowledge; the increase in the number of scientific papers and conferences; the expansion of theoretical discussions on geography (in Izvestiya VGO and in special meetings); the creation of publications by individual branches and sections, and the participation of Soviet geographers in the International Geographical Congress in Rio de Janeiro.

The following resolutions were not implemented: the increase in the size of Izvestiya VGO; more regular appearance of the Zapiski and Geograficheskiy Sbornik, and the creation of a popular geographic magazine titled Zemlya i Lyudi (The Earth and Its People).

The following scientific and organizational recommendations were implemented: the further development of integrated geographic field work and mappi activities designed to uncover natural resources and develop the country's productive forces; the creation of an Institute of Geography of Siberia and the Fa East; the separation of the geography section from the combined abstracts jou nal on geography and geology.

Still to be implemented are the following recommendations: the expansion of the number of geographers in the membership of the Academy of Sciences of the USSR and the academies of sciences of the union republics;the organizati of a separate Division of Geography in the Academy of Sciences (instead of th present joint geography and geology division) and the sharp expansion of the network of stations for integrated geographic observations. The Geographical Society has taken appropriate measure to implement these recommendations.

THE DEVELOPMENT OF INTERNATIONAL SCIENTIFIC CONTACTS AND THEIR IMPORTANCE FOR PROGRESS OF SOVIET GEOGRAPHY

(From Izvestiya Akademii Nauk, Seriya Geograficheskaya, 1960, No. 1, Pages 13 -21).
(Excerpts from a report by the National Committee of Soviet Geographers to the Third Congress of the Geographical Society USSR).

The Second Congress, which met in the winter of 1955, played a key role in promoting international scientific contacts for Soviet geographers. Among its participants were several foreign geographers from the people's democracies and from India. In papers presented at plenary and sectional meetings these foreign guests told of the status of geography in their own countries and commented on a number of geographic problems. After their return home, most of them published special review articles on the Soviet geographic congress and reported their general impressions about Soviet geography. It can thus be said that the inviting of friendly foreign geographers to the Second Congress five years ago marked the beginning of the present stage in the development of international contacts by Soviet geographers. In particular, it supplied many of our foreign friends with information about the current status of Soviet geography and laid the basis of close contacts.

At the start of 1956 a small group of Soviet geographers took part in the International Geography Seminar at Aligarh, which was organized by several Indian scientific societies. In addition to discussing several geographic problems, the seminar, attended by geographers from many countries, decided to organize an International Council for the Study of Afro-Asian Geography. The aims of the Council were to disseminate geographic research on the African and Asian countries, organize periodic conferences and assist in the study of geographic problems of special interest to the peoples of Asia and Africa. Soviet geographers became members of that council and thus for the first time accepted obligations in international cooperation.

In the autumn of 1956 a group of Soviet geographers took part in the XVIII International Geographical Congress in Rio de Janeiro. In addition to presenting a series of papers, the Soviet delegation brought with it a large exhibit of general and special-purpose maps and atlases published in the USSR as well as a special volume titled Voprosy Geografii (in Russian and in French), which contained more than 40 papers submitted by Soviet geographers on nearly all the topics included in the program of the congress. Both the map exhibit and the special volume of papers aroused considerable interest and were favorably commented upon in geographic periodicals. The trip of Soviet geographers to Brazil thus played a major role in developing foreign contacts. It served in particular to disseminate abroad correct information about the methodological principles and the theoretical achievements of Soviet geography and introduced Soviet geographers to active participation in the international geographic community.

The entry of the Soviet Academy of Sciences into the International Geographical Union at the Brazilian congress and the increasing international contacts of Soviet geographers made it necessary to create a special organ to coordinate and promote foreign contacts. Such an organ, created by the presidium of the Academy of Sciences in January, 1957, was the National Committee of Soviet Geographers, made up of representatives of scientific institutions and other agencies engaged in geographic research in the USSR.

In the three years of its existence the committee has done a great deal to promote international contacts in geography. The committee has been reporting on its activities to the Soviet geographic community through annual reports published in Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya (1957, No. 2; 1958, No. 2; 1959, No. 1). In view of the existence of these reports, only the principal facts will be summarized in the present report.

In August, 1957, a small group of Soviet geographers took part in the regional conference of the International Geographical Union in Japan. The proceedings of the conference, published in 1959, included papers by three Soviet geographers.

A year later, in August, 1958, the Commission on National Atlases of the IGU held a plenary meeting in Moscow. Representatives from 16 countries took part, including Soviet specialists, geographers from the people's democracies, and Prof. H. W. Ahlmann, president of the IGU. The conference was well organized and very productive.

In the summer of 1958 and in the autumn of 1959, the Soviet member of the Commission on Periglacial Morphology went abroad to take part in plenary meetings of the commission. The first took place in Paris and the second in Morocco. On both occasions much work was accomplished.

In the summer of 1959 a group of Soviet geographers took part in the special conference on economic regionalization convened by Polish scientific societies. The conference did much valuable work and outlined a course of future studies within the framework of the International Geographical Union.

In addition to these major activities relating to the IGU, the National Committee of Soviet Geographers also promoted other contacts between Soviet and foreign geographers. They included both visits of Soviet geographers abroad, and visits by foreign geographers to the Soviet Union. Within the last three years, Soviet geographers visited all the people's democracies, as well as Britain, France, the United States, Belgium, Sweden, Norway, Austria, India, Japan, Canada, the United Arab Republic, Ghana, Australia and Ceylon. The Soviet Union, in turn, was visited by geographers from the people's democracies as well as from the United States, France, Britain, West Germany, Austria, Norway, Sweden, India, Canada, Belgium and Finland.

It should be noted that while these exchanges were on a completely equal basis when it came to the people's democracies, they were not between the Soviet Union and the capitalist countries. This was especially true of the United States. While quite a few American geographers came to the Soviet Union, only a very limited number of Soviet geographers went to the United States. However, the recent cultural exchange agreement does provide for a special exchange of delegations of Soviet and United States geographers in 1960-61.

Recently the National Committee of Soviet Geographers has concentrated on the preparations for the XIX International Geographical Congress, which will meet August 6 - 13 in Stockholm. The summary program, worked out by a joint Organizing Committee of the five Nordic countries, a list of excursions and symposia and the rules for participation in the congress have already been published. It should be noted that several conditions made by the Organizing Committee somewhat complicate preparations by the national committees. This is especially true of the excessively early dates of applications to excursions, the early deadlines for abstracts and papers, and the publication conditions.

According to a special circular, abstracts had to be submitted by November 1, 1959, papers by April 1, 1960, and applications to excursions (including payments) by February 1 ,1960. The organizers warned that no paper would be included in the program unless a corresponding abstract had been accepted by the Organizing Committee. This meant, in effect, that participants had to be selected as early as August or September, 1959, i.e., one year before the Congress, and that they had to supply almost immediately abstracts of their papers for transmission to the Organizing Committee, and had to select their excursions by New Year's and make the necessary payments. Obviously these early deadlines presented difficulties to the various national committees, although they were clearly dictated by a desire to insure a smooth organization of the congress.

While undertaking to publish in a booklet all abstracts received in time, the Organizing Committee announced that "no papers will be printed in full." The question naturally arises why the full texts of papers had to be submitted at such an early date and what the plans are for ultimate publication.

In an effort to meet all these conditions, the National Committee of Soviet Geographers collected applications for presentation of papers from all persons who expressed an interest in attending the congress. Almost 100 abstracts of papers were forwarded to Stockholm. These abstracts are more or less evenly distributed among the nine sections of the congress (polar and subpolar geography; geographical cartography and photogeography; climatology, hydrography, oceanography and glaciology; geomorphology; biogeography; human geography; economic geography; methodology and bibliography; applied geography). In addition there were applications for the presentation of papers in several permanent commissions, especially those in which Soviet geographers are commission members (national atlases, periglacial morphology, medical geography, arid zones).

The National Committee of Soviet Geographers has also taken several practical steps to organize applications to excursions. However, it is quite obvious that the final composition of the Soviet delegation will not be known until each of the potential participants is informed whether his paper has been accepted and until he knows whether he will be able to leave the country at the time of the congress.

The National Committee of Soviet Geographers is attaching special importance to the proposals sent to the Executive Committee of the IGU for inclusion on the agenda of the General Assembly. This applies especially to proposals urging a review of the present system of permanent commissions, of their scientific objectives, their forms of activity and their methods of reporting to the General Assembly and the Executive Committee. These proposals are designed to direct the work of the commissions along lines of major current theoretical and methodological problems in geography, to insure better planning and effectiveness of their work, to end the haphazard manner of determining and financing study topics, and to strengthen control and responsibility for the work of these commissions. Similar proposals are being offered by the Soviet National Committee with regard to the convening of regional conferences between international congresses.

The National Committee has cooperated with the Geographical Society of the USSR and other geographic institutions in preparing scientific materials for the congress. They include a report on the work of the Commission on National Atlases, headed by Prof. K. A. Salishchev, which will include special methodological aids on the commission's subject; material for the Commission on Periglacial Morphology, prepared by Prof. K. K. Markov; a book on the problem of the water and heat balance of the earth's surface, published by the Hydrometeorological Service; a book on medical geography, prepared by the Geographical Society of the USSR, and a book titled Sovetskaya Geografiya, published by the Geographical Publishing House for the Geographical Society.

The latter book is designed to depict the present status of Soviet geography, its main theoretical achievements and its main study problems. The book will include the following:

(a) a survey of the history and the present status of Soviet geography by general divisions (physical and economic geography, regional geography, cartography) and by specific disciplines of physical geography (climatology, glaciology, permafrost science, hydrology of the land, geomorphology, geographic soil science, geobotany, zoogeography) and of economic geography (geography of population and population centers, geography of industry, agriculture and transportation);

(b) a description of the main integrated study problems and approaches worked out by Soviet geography (paleogeography of Pleistocene and post-Pleistocene times; the heat and water balance of the earth's surface; landscape studies and regionalization; integrated mapping; the development of productive forces of economic regions) and a discussion of the role of geographers in transforming the natural environment in the USSR;

(c) a discussion of geographic field-study methods;

(d) general information on the system of geographic education and the principal ways of popularizing geographic knowledge.

Soviet geography is thus regarded as a differentiated complex of natural-historical and social-economic disciplines that have reached varying stages of development in the USSR but contain a whole series of common problems that are most fruitfully solved with geographic data and by geographic methods.

The book also makes clear that the geographic sciences in the USSR are progressively developing and are closely tied to many practical problems of the national economy.

It is clear from the foregoing that Soviet geographers have been promoting and strengthening international contacts by joining the International Geographical Union, by taking part in scientific congresses, conferences, and meetings, and by visiting foreign countries and welcoming foreign geographers in the USSR. Such contacts enable Soviet geographers to learn about the theoretical and methodological achievements of geography abroad and to publicize Soviet achievements in the field. The question naturally arises: What have Soviet geographers achieved in this regard and what should the objectives be?

The development of international contacts by Soviet science, and geography in particular, is a complicated process. It is associated with overcoming certain artificial political and methodological obstacles in bourgeois countries. We know, for example, that the long period of inadequate international contacts between Soviet and foreign scientists was utilized by political enemies of the Soviet system to create a smoke-screen and misinform world public opinion about the state of Soviet science and its theoretical and practical achievements. One of the best examples of that type, relating to Soviet geography, was recently discussed by I. P. Gerasimov in the journal Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva (1957, No. 4). We are referring to the article by Milos M. Sebor, Canadian geographer, published in Revue Canadienne de Géographie (1956, No. 1) under the pretentious title "Soviet geography, on what principles is it now based?" I. P. Gerasimov's review demonstrated that the article contained no reliable discussion of such principles; in addition to anti-Soviet remarks, it contained a completely distorted view of the essence of Soviet geography, unscrupulously associated, incidentally, with N. N. Baranskiy's name. (Editor's note, S.G.: A rebuttal by I. P. Gerasimov, with an introduction by Trevor Lloyd and comments by Milos M. Sebor, was published in Revue Canadienne de Géographie, 1958, No. 1-2. Mr. Sebor, a former Czechoslovak, is now at Tennessee Polytechnic Institute, Cookeville, Tenn.)

One of the main obstacles to the utilization of Soviet geographical literature abroad is the language barrier. Without any doubt far more Soviet geographers are able to read foreign languages, especially English, than foreign geographers Russian. Although Soviet geographical periodicals circulate abroad in considerable numbers, they are apparently not widely read by foreign geographers. At best the Soviet periodical literature is used on a selective basis for translations of individual articles.

The people's democracies are known to be taking serious steps to overcome the language barrier. They publish systematic review articles on Soviet work and a large number of translations of Soviet geographical articles, including even items that, from the Soviet point of view, are presented only for discussion purposes and are not authoritative.

Nothing of the sort exists in the capitalist countries (the article appeared before SOVIET GEOGRAPHY began publication -- Editor, S.G.) and any reports on Soviet geography published by foreign geographers therefore assume special importance. We can hardly exaggerate, therefore, the importance of even the brief review articles published in capitalist countries by geographers who have visited the Soviet Union. Some of them, for example, the French geographers Pierre George and Jean Dresch and, to a certain extent, the American geographer Chauncy Harris combine in their published surveys of Soviet geography an objective factual statement with an analysis and appraisal of the facts; others, such as the Canadian geographer Trevor Lloyd and the Austrian Hans Spreitzer, prefer more or less passive description. However, since the information on Soviet geography, even in reports of the latter type, is basically reliable, these reports have positive value. The increasing number of first-hand reports are gradually becoming an important source in the Western countries of information on the scientific principles and the achievements of Soviet geography and have aroused a reaction on the part of some leading foreign geographers. They are evidently facing a choice of either studying and using Soviet methodology or disputing it. It can no longer be ignored.

The first of these choices is advocated by the French geographer Jean Dresch. He writes: "The teaching of geography and geographic research have made considerable progress in the USSR...That progress deserves attention both because it makes possible more thorough study of the USSR and many other countries and because it helps develop many common problems in geography. Furthermore, the Soviet methods of teaching and research differ thoroughly from what is happening in France and may serve as material for deep reflection" (Annales de Géographie, 1955, No. 345, p. 378).

The well known Australian geographer O. H. K. Spate, author of the large regional monograph on India and Pakistan, takes careful issue with Soviet geography in the foreword to the Russian edition of his book. He says that his own work follows in the traditions of British empiricism, particularly the philosophic doctrine of John Locke and David Hume. It should be recalled in that connection that Locke's philosophy was characterized by a duality, namely its artificial combination of materialistic and idealistic principles, while Hume was a consistent agnostic and subjective idealist.

In the field of "geographic philosphy" (Spate's expression), he agrees with the Soviet definition of the subject of physical geography, but finds it quite "natural" that his views should diverge from those of Soviet geographers when it comes to "nonphysical" geography (the geography of man or social geography). The essence of that divergence is seen by O. H. K. Spate in the Soviet geographers' complete rejection of geographic determinism. Spate says that in using its doctrines he"tends to follow a less idealistic line than the possibilists' school, which is still strong in the West" (O.H.K. Spate, Indiya i Pakistan, Moscow, 1957, p.8). On the basis of his adherence to "geographic determinism," Spate says that Soviet economic geography "does not include a whole series of social phenomena that are evidently linked to a substantial degree with the physical differentiation of the earth's surface."

In 1959 the American geographer David Hooson published a long and interesting article titled "Some Recent Developments in the Content and Theory of Soviet Geography" (Annals of the Association of American Geographers, 1959, No. 1, pp. 73-82). The author displays thorough familiarity with the Soviet geographical literature and in some of his statements offers a correct appraisal of some recent developments. However, he uses his knowledge of the trends in Soviet geography chiefly to glorify bourgeois geographic science, masking its own methodological weaknesses and trying to minimize the progressive principles of Soviet geography.

For example, in stressing the quantitative predominance of physical-geographic work over economic-geographic work in the USSR, he compares the situation with the "Davisian heyday" in the United States. Hooson sees an apparent contradiction between that physical predominance and the fact that "physical determinism is vigorously denied and economic determinism upheld" in the USSR. Referring repeatedly to an "official doctrine of segregation of a unified science" into physical geography and economic geography, the author makes a special effort to present statements by individual Soviet geographers of the "monistic" school. In this connection, he approves without qualification certain statements made by V. A. Anuchin for discussion purposes and describes them as "the most articulate, uncompromising, and thorough theoretical advocacy of a unified geography in the USSR." In an effort to defend monism in geography by citing Soviet studies, the author also refers to certain statements by representatives of the so-called regional school in Soviet economic geography.

At the same time, Hooson's article contains serious internal contradictions. They arise essentially from the comparison of the methodological strength of Soviet geography with the weakness of bourgeois geography. No matter how Hooson tries to conceal these methodological relationships, they nevertheless clearly emerge from his paper. Take, for example, Hooson's general appraisal of the achievements of Soviet geography and their importance for world science. At the very beginning of his article, Hooson says with considerable restraint that "the last few years have witnessed an increase in the output of Soviet geographical writing to a point where it is at least as voluminous as that of any other country." But at the end of his article, he writes that "the broad field of physical geography is seriously underdeveloped in the West in comparison with the Soviet Union." While condemning Soviet geography for denying geographic determinism and upholding "economic determinism," he at the same time writes about the "virtual extinction of crude environmentalism" in the West, which we know to have been simply a recent form of geographic determinism. Finally, while supporting all "monistic" views of Soviet geographers, Hooson at the same time raises the question whether "the foundations of our 'bridge' with which we (American geographers) straddle the physical and social sciences may prove to be built on sand, to be swept away by some future tide of logic or experience."

Such obvious inconsistencies by a modern bourgeois geographer in his general appraisals and methodological positions appear to be hard to understand at first glance. However, they become clearer if we recall the general state of present bourgeois geographic theory. Material for such a judgment is furnished by critical analysis of the methodological content of American Geography, Inventory and Prospects (translated into Russian and reviewed in Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, 1956, No.1) and by an examination of Edward Ackerman's recent study Geography as a Fundamental Research Discipline (Chicago, 1958).

What appears to be a serious ideological crisis of modern bourgeois geography was already noted in the discussion of American Geography by Soviet geographers. Bourgeois geography's basic theoretical concept -- geographic determinism (environmentalism, possibilism) -- has turned out to be completely sterile from a practical viewpoint and has often replaced serious scientific research with a superficial and lightweight play on words and concepts. In an equally difficult position is the old chorological concept, which has artificially limited the subject of geographic research and has led its followers into the blind alleys of agnosticism and idealism. The practical requirements of modern geography are therefore forcing bourgeois geographers to find more reliable approaches to theoretical studies. Of special interest from that point of view are many statements in Ackerman's book and in similar foreign studies. They note the lack of a general theory of fundamental research in geography, the need for a historical approach and for a study of "covariations" of geographic phenomena, the steady development of the quantitative and experimental approach and so forth. It is interesting to note that Ackerman's concern with the general state of bourgeois geographic theory is so great that he proposes, at least in the immediat future, "to avoid as far as possible the study of complex problems of integration," to concentrate attention on the study of "simple situations" and in general to try to give "fundamental geographic research a predominantly analytical character."

The foregoing comments make quite clear the deep and fundamental difference in the methodological potential of Soviet and bourgeois geography in trying to develop a general theory of geography and to apply it to practical tasks. Soviet geography is rapidly developing on the basis of the dynamic Socialist construction of a new world and its theory has been fertilized by the brilliant doctrine of dialectical and historical materialism. Bourgeois geography is in the midst of deep methodological crisis and ideological confusion despite the fact that it disposes of an impressive technical and methodological potential for carrying out research.

The foregoing comparison does not mean that Soviet geographers can now start "demobilizing." On the contrary, the potential advantages of the methodological principles of Soviet geography require us to press and expand our theoretical studies. It means that while strengthening our ideological unity we must make greater progress toward developing a general theory of Soviet geography. In doing so, we should reject and criticize any erroneous methodology of bourgeois geography, but we should also familiarize ourselves with and make use in our own work of any progressive elements in the methodology and techniques of foreign geographic studies.

The steady expansion and strengthening of the international scientific contacts of Soviet geographers will help to make this possible.

Bureau of the National Committee
of Soviet Geographers

THE ORIGIN AND EXTENT OF THE NAME TIEN SHAN

By B. A. Lunin

(From Izvestiya Akademii Nauk SSSR, Seriya geograficheskaya, 1959, No. 2, Pages 77 - 79).

The etymology of the name of the mountain system Tien Shan, unlike a number of others, is clear and simple. These Chinese words may be translated literally as "Heavenly Mountains." There is definite historic interest, however, in the use of this name for a vast mountain system populated in its western and eastern parts by different peoples.

Usually local residents, especially in the first stages of social development, give to geographic objects names that are limited in extent; in the Tien Shan, for example, only to individual natural features, mountain ridges, streams, etc. The names of the Trans-Ili, Kirghiz and other mountain ranges were given by Russian explorers. They usually designated these features by local geographic names, sometimes after their geographic location. Later these names gained a firm foothold in the geographic literature and were adopted by the native residents of this region.

Apparently, the same happened with the toponym Tien Shan. Chinese travelers extended a formerly very restricted name to a considerably larger territory. In this broader sense, it passed into Chinese literature and then, through the studies of Russian and West European sinologists and geographers, into world literature. As the Kirghiz nationality, language and literature developed, the geographic name Tien Shan was widely adopted by the Kirghiz people, which has long inhabited the western part of the mountain system.

It may be supposed that the name "Heavenly Mountains" was originally given only to the mountain ridge or its highest summit, situated near the city of Urumchi and called Bogdo-Ola or Bogdo-Ula ("Holy Mountain") on modern maps. They have been described repeatedly by Chinese travelers. "Three outstanding peaks reflect the sun's rays with ice and snow like crystals; touching the clouds, they cover the sun and the moon... The snowy range here is contiguous with the heavens, and man never reaches it! Indeed, this glorious stronghold is the first in the Northern countries. And there is no man who could portray it on a map!" So these mountains are described in Chinese sources, from which excerpts are given in N. Ya. Bichurin (1829) and Ye. Timkovskiy (1824).

It may be assumed that the geographic name of this mountain group was extended by the Chinese travelers to the Tien Shan mountain system.

P. P. Semenov-Tyan-Shanskiy once suggested that "the Chinese name of the whole mountain system of the Tien Shan (Heavenly Mountains) originated" in the Tengri-tag mountain hub (1947, p. 297).

In the ancient Chinese literature known to us through translations, the boundaries of the mountain system of the Tien Shan (Heavenly Mountains) were not always outlined with sufficient definiteness, and it was given various names.

According to ancient Chinese sources, the western enclosure of Central Asia (in the modern sense, the Pamir, Alay and Tien Shan) was called the Onion Mountains (Ts'ung Ling) or Heavenly Mountains (Tien Shan). Thus, N. Ya. Bichurin states: "The Heavenly Mountains, Tien Shan in Chinese, constitute in Eastern Turkestan a chain of huge and very high mountains extending from the Onion Mountains eastward to Hami. This range the Chinese also call the White Mountains (Pai Shan), Cheloman Shan, the Snowy Mountains (Hsüeh Shan), or in the ancient Mongolian language Ch'i-lien-Shan" (1953, p. 41).

The same text says of the Onion Mountains: "They lie to the west of Kashgar and form a prolongation of the Heavenly Mountains. The mountains lying west of Kashgar and Yarkand belong to the system of the Onion Mountains. They have different local names, but from time immemorial their common Chinese name has been Ts'ung Ling...The Onion Mountains adjoin the great snowy mountains (Hindu Kush) on the south and extend in the north to Lake Balkhash... In Western Europe the Onion Mountains are known as the Pamirs (1953, p. 35). Elsewhere the author writes: "That river (the Ili - B. L.) rises on the north side of the Onion Mountains.. (1950, p. 315).

On the basis of Chinese sources, K. Ritter defines the geographic location of the Tien Shan in the following manner: "Between the source of the Syr-Dar'ya, flowing west to the Aral Sea, or the meridian of Kashgar on the west and the meridian of Hami and Barkol on the east, i.e., for a distance of 250 geographic miles, extends a system which we know partly from Russian, but principally from Chinese sources and which we designate by the Chinese name of Tien Shan (Heavenly Mountains), although other ancient peoples have given it names with the same meaning in their own languages. Thus, in the ancient Turkic language it was called Tengri-Tag, and in Hunnic Ch'i-lien or Kiloman, names identical in meaning with the Chinese. Because of their snow-covered summits these mountains were further given by Chinese authors the name of Hsüeh Shan (Snowy Mountains)" (1859, p. 7).

Despite some vagueness and contradictions in ancient Chinese sources regarding the extent of the terms Tien Shan and Ts'ung Ling, it is difficult to agree with the complete identification sometimes made between the ancient Chinese Ts'ung Ling and the Pamirs.

It is more likely that the Onion Mountains of the ancient Chinese embraced not only the Pamirs, but also a part of the present western Tien Shan. Thus, according to the ancient Chinese sources, the dividing line between the Ts'ung Ling and the Tien Shan apparently ran approximately along the meridian of Kashgar. In all probability, the mountain chains lying to the north of Lake Issyk-Kul' belonged to the Ts'ung Ling.

In the Russian geographic literature the name Tien Shan does not appear until the second half of the 18th century, although commercial and diplomatic relations between Russia and Central Asia had been developing for a long time. It was natural that the geographic concepts of Central Asia should have become known along with those relations. However, little was known about the Tien Shan for a long time. The name Tien Shan is missing from the book Bol'shoy Chertezh (The Great Atlas) and other old Russian geographic sources. The region of the Tien Shan is usually shown on the first Russian maps showing adjacent territories. These maps usually designated individual parts of the mountain system as Ledyanyye Gory (Ice Mountains) and Mustag. The maps also show the headwaters of the Syr-Dar'ya and Amu-Dar'ya. Such, for example, are the maps of Remezov (1701), Kirillov (1754) and Unkovskiy (1723).

In a number of studies by I. K. Kirillov, V. N. Tatishchev, P. I. Rychkov and others, Central Asia is described to varying degrees, but the name Tien Shan is not mentioned. However, Pallas speaks of the Heavenly Mountains and gives a description, although he does not define their location correctly.

The toponym Tien Shan penetrated into Russian geographic literature from China, with which there were diplomatic and commercial relations. Bichurin, Zakhar'yev and other sinologists undoubtedly played a great role in publicizing the name. The first Russian explorers of the Tien Shan, P. P. Semenov-Tyan-Shanskiy, N. A. Severtsov, I. V. Mushketov and others, widely use the name Tien Shan. P. P. Semenov-Tyan-Shanskiy, on the basis of Chinese sources, gave the name Tien Shan only to the Terskey-Alatau and the ranges lying to the south and east of it. N. A. Severtsov analyzes the Chinese meanings of Ts'ung Ling and Tien Shan in considerable detail and finally writes: "I consider it possible to combine both these highlands (meaning the northern Ts'ung Ling -- B. L.) under the name of Tien Shan of Semenov" (1947, p. 149).

However, just as in the old Chinese literature, the boundaries of the mountain system of the Tien Shan are still not adequately fixed. The broadest conception of the Tien Shan is that of L. S. Berg (1913). Lately, a majority of investigators have been inclined to constrict its boundaries.

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NEWS NOTES

By Theodore Shabad

New Urals Copper Center. The new copper-mining center of Gay is under construction in Orenburg Oblast of the southern Urals, 20 miles NNW Orsk and 12 miles from the Ural River. The Gay site, discovered about 1950, is said to have reserves second only to the Dzhezkazgan site in Kazakhstan, but with a higher copper content (up to 8 per cent). Planned 1965 ore output at Gay is expected to exceed the present production of the entire Urals.

Angara-Ilim Iron Mine. The iron-mining and concentrate center of Zheleznogorsk (formerly called Korshunikha), on the Tayshet-Ust'-Kut railroad, just east of the Ilim River, is expected to start production in 1961. Zheleznogorsk will supply iron concentrate at first to the Kuznetsk steel pla over the Stalinsk-Tayshet railroad, now under construction. Upon completio of the Tayshet steel plant, Zheleznogorsk concentrate will be shifted to Tays

Kola Peninsula Hydro Project. A joint Soviet-Norwegian hydroelectric project is getting under way on the lower reaches of the Pasvik River, on the border between the two countries. Norway will supply the equipment (except turbines) for the 52,000-kw. Borisoglebsk hydro station, to be completed by 1963. Other hydro projects are planned on the middle and upper reaches of the Pasvik River.

Konakovo Gas-Fueled Thermal Power Plant. A large thermal power plant of the order of 1,000,000-kw. capacity is to be built in 1961-63 at Konakovo (Kalinin Oblast) on the south bank of the Moscow Reservoir of the upper Volga River. The Konakovo plant will burn natural gas from the North Caucasus fields. It will supply power to the Moscow and Leningrad metropolitan areas.

Peking-Chengteh Railroad Opens. Completion of this line, on which construction began in 1956,provides a second rail link between North China and Manchuria, taking some of the traffic from the overloaded coastal railroad through Shanhaikwan. The Peking-Chengteh line, originally built by the Japanese, was later destroyed and has now been rebuilt with a new alignment.

Urals Paper Production. The three paper mills of Krasnokamsk, Borovsk (near Solikamsk) and Krasnovishersk, all on the upper Kama River and its tributary, the Vishera, produce almost one-fourth of Soviet paper.

Ekibastuz Production Cutback. The Ekibastuz coal-mining center, producing low-ash steam coals in open-pit mines, is lagging behind original plans. The 1960 production plan is 6.6 million tons compared with an original goal of 11 million tons of coal by 1960.

Novotroitsk Steel Plant Now Integrated. With the completion of the so-called 2800 rolling mill, this southern Urals center has become an integrated iron and steel plant. Other integrated Urals plants are at Magnitogorsk, Chelyabinsk and Nizhniy Tagil.

Magnitogorsk Expansion Planned. Production at this largest Soviet steel plant, now at 6 million tons a year, is to be expanded to 12 million tons, according to a statement by Premier Khrushchev in India. No date for completion of the expansion has been announced.

Central Asian Aluminum and Hydro Project. Preliminary plans have been published for the utilization of kaolin deposits, constituting an overburden at the Angren (Uzbek SSR) coal mines, for the production of alumina. The alumina is to be converted into aluminum with the aid of hydroelectric power to be produced by the planned 2,500,000-kw. Nurek hydro project, on the Vakhsh River, ESE of Stalinabad (Tadzhik SSR). Completion is not expected before 1965.

Nalchik Molybdenum Plant. The Nalchik Hydrometallurgical Plant, due to open at the end of 1960, is situated in the Northern Caucasus. It will extract molybdenum from tungsten-molybdenum concentrate produced at near-by Tyrny-Auz. This mining center, on the slopes of Mount Elbrus, is one of the Soviet Union's leading producers of molybdenum and tungsten.

More About Lake Baykal's Depth. A note in Soviet Geography (April 1960, p. 84) stated that the greatest depth of Lake Baykal was 1,741 meters. This was based on recent Soviet maps. Izvestiya of April 12, 1960, announces that the greatest depth that can be confirmed by new soundings is 1,620 meters.

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